

**HOW CAN SUSTAINABLE SOLID WASTE
MANAGEMENT BE ACHIEVED IN SRI LANKA?
AN INQUIRY INTO THE ROLE OF EDUCATION AND
AWARENESS BUILDING THROUGH GRASSROOTS
EFFORTS**

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List of Abbreviations and Acronyms

CBO	Community Based Organization
CEA	Central Environmental Authority
DS	Divisional Secretary
ECO-V	Eco-Friendly Volunteers
EFL	Environmental Foundation Limited
GN	Grama Seva Nildari
HDPE	High Density Polyethylene
IGO	Inter-Government Organization
INGO	International Non-Government Organization
IOM	International Organization of Migration
IUCN	World Conservation Union
LDPE	Low Density Polyethylene
NGO	Non-Government Organization
NSSWM	National Strategy for Solid Waste Management
PE	Polyethylene
PET	Polyethylene terephthalate
PHI	Public Health Inspector
PP	Polypropylene
PS	Pradeshia Sabha
PVC	Polyvinyl chloride
PVDC	Polyvinylidene
Rs	Sri Lankan Rupees
SDC	Sarvodaya District Coordinator
SSS	Sarvodaya Shramadana Society
STO	Sarvodaya Technical Officer
SU	Sarvodaya Unit
SWM	Solid Waste Management
3R's	Reducing, Reusing, Recycling
UC	Urban Council
UDA	Urban Development Authority
UNCED	United Nations Conference on Environment and Development
UNCED	The Earth Summit
UNDP	United Nations Development Project
WB	World Bank

Dedication

"O' great King! the birds of the air and the beasts on the earth have an equal right to live and move about in any part of this land as thou. The land belongs to the people and all other beings and thou art only the guardian of it."

**Arhat Mahinda to Sri Lankan King Devanampiyathissa.
3rd Century B.C.**

I would like to thank several people, without whose assistance and inspiration this report would not have been possible. Thanks are due to Kanchana Weerakoon Ranasinghe of ECO-V Environment Friendly Volunteers of Sri Lanka. Her insight into the Sri Lankan culture and her extensive experience with, and knowledge of, environmental issues were invaluable; Sugathadasa uncle who provided a perpetual stream of newspaper articles about the solid waste issue in Sri Lanka; Mrs. Badra Rodrigo who provided excellent translations and insights into the culture, as well as housing and food for both my body and soul while I was writing; my son, Brendan, who kept the conflict situation in perspective for me; Achala Navaratne, my mother, and the friends who kept me inspired and focused while I was completing this research.

Special thanks are due to Sarvodaya, Dr. Athukorala and Paul Ventura, Claire Weston, my cohort, and the amazingly generous and loving people of Sri Lanka. I hope that this paper will, in some small measure, give something back in return for all that I have gained this year.

Abstract

Sri Lanka is facing a dilemma of how to effect economic development while preserving its rich environment and culture. As people's lives and incomes rapidly change, traditional methods of waste disposal become increasingly inappropriate and detrimental to health. Existing organizations are taking steps to address the issues but, individually, lack the necessary network and linkages to effect widespread change.

This paper looks at current solid waste management issues in Sri Lanka and explores how Sarvodaya, as the largest and most imbedded Sri Lankan development organization, might be the missing link in the successful implementation of sustainable waste management in Sri Lanka. Furthermore, this paper will offer recommendations for integration of environmental education into its programs of Individual and Village Awakening, and formation of creative partnerships to promote a nationwide education and awareness campaign for responsible solid waste policy and behavioral change in Sri Lanka.

Research for this paper addressed the question of whether environmental education and awareness programs, at all levels of society, can effect behavioral change. A garbage measurement project, awareness programs, and interviews with the leading departments and organizations in Sri Lanka were the basis of the research.

Data gathered revealed a gap between education and action that can be bridged by a well-established system of participatory community development. The support system afforded by a multi-stakeholder partnership, combined with a firm political commitment and appropriate technology, offers the promise of a sustainable solution to the waste management crisis faced by Sri Lanka.

1. Introduction

1.1 Context of the Inquiry

I am an American woman and a single mother, with a professional background in Organic Agriculture, Environmental Studies and Environmental Education. I conducted this research as an integral part of a one-year practical Master's Of Arts program in Sustainable Development conducted in Sri Lanka by the School for International Training (located in Vermont, USA), in partnership with the Sarvodaya Shramadana Movement of Sri Lanka.

Impressions from my first few weeks in Sri Lanka raised concerns about the waste management situation in the country as piles of garbage obstructed the sidewalks along the route to the university, newspaper articles revealed an issue of unmonitored, open dumping of hazardous and household wastes in wetland areas, and outings with the Sri Lankan environmental group, ECO-V, made clear the lack of proper management and enforcement of waste management.

As a developing country, Sri Lanka faces the probability of increasing amounts of waste, with ever more toxic components. Although there is a National Strategy for Waste Management, the strategy is not being implemented. There have been numerous environmental awareness and education programs undertaken, by governmental bodies as well as non-governmental organizations. Still, no significant progress has been made in improving the waste management issue in Sri Lanka.

My research sought to uncover probable causes for the failure of waste management strategies and projects and to reveal promising avenues toward more successful efforts in the future. Through the course of the research, it became clear

that a major issue is the lack of coordination of efforts and an absence of local investment in the process.

The question I sought to answer in my research is how to achieve sustainable solid waste management in Sri Lanka. The lens through which I looked at this question is the Sarvodaya Shramadana Peoples Movement of Sri Lanka. Literature review, a garbage measurement project, semi-structured interviews and environmental education and awareness building programs provided data for the inquiry. Research was conducted in Sarvodaya villages that had been affected by the December 2004 Tsunami. Recommendations are targeted at Sarvodaya as the most likely vehicle for effecting lasting change, at the grassroots and institutional level, for the Solid Waste Management crisis faced by the country.

Sarvodaya is in a unique position to contribute positively to the current situation, and they are committed to participating in such an undertaking. In over 15,000 villages island-wide, they have already established the structures and infrastructure needed to implement awareness and educational programs, and community based waste reduction strategies and businesses, The emphasis on “development of self-reliance through the cornerstone technique of Shramadana” (shared, voluntary labor) offers the ideal foundation upon which to create a community based, sustainable solution to the SWM issues that plague and poison the country.

Sarvodaya has piloted several villages that have a specific environmental focus. The Development Education Institute at Tanamalvila was started in 1972 and offers agricultural and technical training to youth from across the country. This project is an affiliate of the Global Ecovillage Network for South Asia (GENSA) and has become a “recognized Center for Environmental Studies, hosting several national

level training programs on environmental conservation and ecovillage development” (Annual Report, 2003-2004). The Lagoswatte Eco-village in Kalutara District is a tsunami victim relocation village developed in partnership with the government, United Nations Development Programme (UNDP) and other international partners built upon the principles of environmental stewardship. Both of these villages illustrate how effective Sarvodaya can be in impacting the SWM issue, and can serve as training centers for other village undertakings.

It is with a sense of gratitude to Sarvodaya for their mentorship this year, and hope that my research will offer something of value to both Sarvodaya and Sri Lanka that I offer this paper.

1.2 Aim of the Inquiry

The aim of the inquiry was to gain insight into the current status of the Solid Waste Management issue in Sri Lanka; to review projects and studies that have been undertaken in the country to date; to review projects and studies undertaken in countries with solid waste management issues similar to Sri Lanka’s (Bali, Korea, North American Indian Tribes, and Singapore); to research how local communities respond to an ongoing project of environmental education and awareness building combined with technical support; to analyze past SWM projects and possible reasons for their successes and failures.

This paper will look at whether environmental education and awareness programs can effect behavior change, and what support systems are required to sustain those changes. In addition, this paper considers where the gaps are in current practices and the role Sarvodaya can play in establishing the vital linkages and networks required to effect nationwide, sustainable change. Through building creative multi-stakeholder partnerships and utilizing its massive network of village societies,

Sarvodaya may play a key role in protecting the unparalleled biodiversity and environmental wealth of the country.

This project has broad applicability in social and environmental realms. Garbage is a fascinating indicator of cultural values and priorities. The study of garbage, and people's attitudes about waste management, often reveals hidden treasures that can enrich multiple dialogues among diverse interest groups.

1.3 Location of study

Research at a grassroots level was conducted in the post tsunami Sarvodaya village of Wadduwa/Thalpitiya between Panadura and Kalutara along the southern coast of Sri Lanka, and in the tsunami relocation Eco-village of Lagoswatte near Kalutara. Literature review was conducted primarily through current Internet resources and literature from Sarvodaya, Central Environmental Authority, Environmental Foundation Ltd. and the government. Interviews with officials were conducted primarily in Colombo. While completing this research I lived part of the year in Dematagoda, Colombo and part of the year in the village of Thalpitiya.

1.4 The Solid Waste Problem

In the capital city of Colombo enormous piles of garbage accumulate underneath faded signs that read "Your municipal dollars at work." In Panadura, next to the train station, a mountain of plastics, organic matter, tires, paper, etc burns slowly day after day. Garbage is found in piles along roads, clogging drainage ditches and waterways, strewn along the beaches and wild areas. Dogs, cats, rats, cows, elephants, water monitors and all manner of wild and domestic animals eat the food wrapped in polythene lunch sheets and bags and often die as a result of the strangling or blocking of internal organs. Disease carrying mosquitoes breed in the mountains of

coconut shells and scattered plastic bottles filled with rainwater. Flies flourish in the piles of organic waste mixed in with household and industrial waste.

Approximately 6400 tons of solid waste are generated daily in the country. Daily waste collection is around 2500 tons, so less than 40% of the total generated, (of which 57% is accounted for by the Western Province) by municipal services that lack adequate financial and human resources, proper management and lack of capacity to properly manage the demand (Pilapitiya, 2006). People don't know when collection will occur and so litter is set out (often in polythene bags) daily rather than set out on specified days. This invites scavenging by animals and the scattering of garbage everywhere. Due to a lack of sufficient land and resources, as well as poor planning and erratic service, most of the waste in the country is unmonitored and is disposed of into unmanaged dumpsites in wetland areas, and along the roads, streams and rivers resulting in leachage of toxins into drinking water. Open burning of mixed wastes is common in both rural and urban settings, contributing to poor air quality and a number of health concerns. Haphazard wild dumping is the most commonly practiced means of waste disposal.

1.5 Government Organization

The government structure of Sri Lanka is divided into National level (the President, Parliament, Ministries and connected departments, etc.), Provincial level (headed by the Provincial Councils), District level (headed by Government Agents), Division level (headed by Divisional Secretaries), Pradeshiya Sabhas, Municipal and Urban Councils, and the Grama Seva Nildaris which generally have a Public Health Inspector assigned to them and who is responsible for solid waste management. The Ministry of Forestry and Environment and the Central Environmental Authority are responsible for solid waste management policy making (van Zonn, 2000). A National

Waste Management Strategy has been drawn up and legislation enacted to effect sustainable solutions to the waste issues in the country. However, implementation has fallen short (Pilipitiya, 2006). Local authorities (Urban Councils and Pradeshiya Sabhas) are responsible for the collection and disposal of solid waste. Currently household, industrial, medical and septage wastes are all being disposed of together without precautionary measures (Van Zonn, 2000).

1.6 Inter and Non-Government Organizations

Sri Lanka has numerous inter and non-governmental agencies and organizations dedicated to public and environmental health. This inquiry looks at only a few of them, however these examples offer an idea of the work that is being undertaken by Sri Lankan and international organizations to address the SWM issue.

The Central Environmental Authority works with the government, and is funded by outside funders, to promote and implement solutions to the SWM problem.

ECO-V is a Sri Lankan environmental awareness and research organization run by Kanchana Weerakoon Ranasinghe and Thushara Ranasinghe in Moratuwa.

Environmental Foundation Ltd. is a legal watchdog organization operating out of

Colombo. The Artacharaya Foundation in Galle and Matara is a Sri Lankan

organization focusing on Solid Waste Management and Water & Sanitation. IUCN is

an international organization conducting awareness and conservation projects out of

Colombo. Project Galle is an NGO developed by expatriates after the Tsunami who

have done considerable SWM work. Practical Action is a Colombo based NGO that is

also doing extensive work in environmental education, infrastructure building and

practical solutions to SWM issues. IOM conducted numerous water & sanitation

projects in transition camps after the Tsunami. The Lanka Jathika Sarvodaya

Shramadana Movement has undertaken several environmental projects, including the

Lagoswatte Eco-village, and some environmental education and bio-diversity projects.

The organizations that I spoke to, including the Lanka Jathika Sarvodaya Shramadana Movement, expressed deep concern with the SWM problems and a desire to contribute to sustainable solutions.

2. Literature Review

2.1 Similar Scenarios:

Literature on Sri Lanka, Bali, South Korea, and North American Indian tribes was investigated in order to get a sense of the solid waste situation in areas facing challenges similar to Sri Lanka's. Singapore was also researched because it faces similar challenges as far as population and limited land but has access to resources and technology that have enabled it to implement innovative, expensive solutions that can provide insight into what might be possible in the future for Sri Lanka.

Areas researched are post-colonial, with growing populations that have experienced a surge in 'development' over the past fifteen years. Bali and Sri Lanka, and to some degree the American Indian tribes, are particularly similar in that they have rapidly expanding urban populations, rely on tourism and have unique regional cultures. Bali and Sri Lanka are both tropical islands that have experienced economic difficulties and ethnic conflict. Bali, Sri Lanka and South Korea all have high population densities, and a lack of land availability, which has had an enormous impact on the solid waste issue. Organic wastes are the largest component and typical solid waste treatments are landfill, sea dumping, wild dumping in wetlands, and to some degree recycling. South Korea incinerates approximately 23% of its solid waste (US & Foreign Commercial Service Report, 2003). For Bali and Sri Lanka incineration is not considered a viable option due to the high moisture content in the waste and the toxic by-products created by burning of plastics, polythene, etc (Sunday Observer, October 31, 2004). American Indian tribes are essentially islands within the larger continent of North America and suffer from many of the same problems that other developing countries grapple with: lack of resources, lack of internal skilled

experts, lack of access to power and technology, and lack of autonomy due to indebtedness and poverty.

Many projects have been undertaken in developing countries, with governmental, World Bank, corporate and private funding, specifically targeted to address the growing solid waste issues. South Korea has taken an approach that focuses on developing the market for wastes. Participation of foreign environmental companies in managing the solid waste issue is encouraged, and the issue of SWM is presented as a viable business opportunity. Whereas a few years ago, open dumping type landfills were the only type of landfill available, there are now newly developed sites using modern technologies to reduce environmental pollution caused by leachate and gas emissions (US & Foreign Commercial Service, 2003). Landfill gas harvesting is an emerging business. The city of Seoul has installed 100 methane gas extraction wells into an existing landfill site and uses the captured gas to heat and cool neighboring households and businesses. Private and foreign industry is primarily in charge of the 30 municipal and more than 7,000 private waste incinerators currently in operation. Recycling is a major emergent industry in South Korea. The government is sponsoring numerous projects and policies to encourage recycling of household and industrial wastes. Refuse-derived fuel generation is an area that is currently being investigated as a viable means of disposing of the 4.1 million tons of food waste generated annually. Solid waste treatment plants have become increasingly privatized and dominated by foreign companies. While the market-based approach appears to be succeeding in many arenas (South Korea's recycling business has grown from USD 1.2 billion in 1998 to USD 3.2 billion in 2002) and the government has targeted a landfill rate reduction from 47% to 17% by 2011, there does not seem to be a significant community participation element in the tactics adopted by South Korea.

There also does not seem to be a great deal of concern about the environmental impacts associated with incineration, which is the most widely accepted method in South Korea for waste disposal. SWM tactics focus almost exclusively on the financial incentive aspect of waste management, to the exclusion of considerations like local employment generation, the dependency syndrome, environmental conservation and community driven initiatives. Cultural heritage preservation does not seem to be a consideration either (ISA, 2003).

Bali has undertaken several SWM projects; a World Bank funded project implemented in 1997 was studied for this research. The project focused on “improve[ment of] urban infrastructure services in Bali in a sustainable manner” through “urban infrastructure investments, private sector participation, cultural heritage conservation, and institutional strengthening.” (WB Bali project, 1997). Answers to the SWM issue included increasing composting operations and acquiring land for sanitary landfills as well as encouraging recycling on a broad scale. The private sector, cultural heritage conservation, community based poverty alleviation programs supporting small-scale pilot investment village level projects, and labor intensive works to provide jobs to the unemployed poor were important components of SWM projects, as part of a holistic approach to the issue in order to assure sustainability. Key stakeholders were frequently consulted, building in a participatory element that enhanced commitment to the projects; the project was rated by World Bank evaluators as highly satisfactory. Some of the reasons for its success were listed as: the focus on cultural heritage, a trend towards decentralization of power, strong client commitment (especially at provincial and local levels), and dedicated supervision from the field supervisors of the World Bank (WB Bali Project, 1997).

Research of North American Indian tribal SWM projects focused primarily on a

document generated by the Environmental Protection Agency (EPA) in response to recommendations from The National Tribal Environmental Council in 1998. There were many thoughtful and pertinent points in this document that, I believe, have relevance for the SWM situation in Sri Lanka. The foundation of the recommendations was that any approach must be holistic and address issues of community involvement, community health, environmental health, poverty, collaboration with other agencies and tribes, capacity building and sharing of information (EPA, 1999). See Appendix I for some of the key recommendations. A key difference between the Native American Tribes and Sri Lanka, Bali and Korea is that the Tribes may have access to the established, sophisticated governmental structure and cutting edge technology of the United States. Even though access to these resources is limited, the Tribes do have some historical, political leverage and can utilize the resources of the larger context surrounding their reservations.

Sri Lanka has implemented numerous solid waste management projects over the past ten years, with some degree of success but, without a significant shift in the situation. It would appear, actually, that the situation is worsening as the country continues to develop economically (Bandara, 2003). In addition, the Tsunami devastation and necessity of providing relief and rebuilding aid to rehabilitate the affected peoples and areas, as well as the focus on resolving the conflict in the North and East have diverted resources and attention from the solid waste issue. Debris from the Tsunami itself, the rapid relief efforts that ensued, and the lingering temporary and transitional housing situations have created a unique SWM issue that needs to be addressed (UNEP/OCHA, 2005). Country wide SWM infrastructure is weak, equipment is old and ill maintained, absenteeism is extremely high among municipal

waste collectors, and resources that are spent are often misspent on duplication of efforts or corruption (Pilapitiya, 2006).

The World Bank undertook an Urban Infrastructure project in 2002 that was rated by World Bank evaluators as highly unsatisfactory. There are many possible reasons why projects fail to meet the expectations and good intentions of the implementers. The report, and much of the literature researched, attributes the low success to lack of coordination, inadequate political will, too many players, jealousy among agencies and villagers, mistrust of new ideas, and resistance to change (WB, 2003; Pilapitiya, 2006; van Zonn, 2000; Bandara, 2003).

As is true in other developing countries, Sri Lanka suffers from a lack of financial and human resources to obtain and implement expensive technologies, and has a shortage of skilled experts. Though the literacy rate in Sri Lanka is extremely high, graduates are completing higher education without gaining practical, applicable skills and experience (Gunawardena, 2006). Well-written, progressive reports are generated and published that never get implemented. Responsible solid waste management is expensive and at present does not offer adequate incentive to encourage people to change their current unsound practices (Pilapitiya, 2006). There is more money to be made by illegally filling in a wetland area with unmonitored solid waste and selling it as a construction site for homes and businesses than there is in sound solid waste management (Pilapitiya, 2006). In the absence of enforcement of regulations and disincentives for unsound practices, the irresponsible habits tend to be the norm and the public health suffers as a result, particularly the poor and disadvantaged (Pilapitiya, 2006).

Singapore is a small-island city-state facing similar issues, but it has access to financial resources and well-organized services for managing the challenges presented

by SWM. Singapore has achieved noteworthy success in managing its solid waste. This could be, in part, due to the strict penal system that inhibits illegal solid waste management practices that other countries may or may not want to replicate. Notwithstanding, Singapore still serves as a model of what is possible when responsible solid waste management is made a priority with governmental commitment. Education, economic incentives and disincentives, and thorough research into best practices have also played a role in Singapore's success.

We can draw from the research that has guided SWM decisions in Singapore to inform future planning for Sri Lanka. In a report prepared by Tan and Khoo, the various waste management options - including landfilling, incineration, recycling and composting - available were assessed and evaluated for impact and feasibility (Tan and Khoo, 2006). The report concluded

“incineration imposes considerable harm to both human health and the environment”, “landfill gases and leachate generate minimal environmental damage because of ...policy to landfill only 10% of total disposed wastes” “composting of horticultural wastes hardly imposes any environmental damage,” “of all the waste strategies, recycling offers best solution,” and “significant emission savings can be realized through recycling” (Tan and Khoo, 2006).

The report offers advice to other countries, particularly small islands like Singapore, to protect the “physical land resources and air” by not “overwhelming by pollution from wastes”, by not burning (particularly plastics and paper/cardboard), landfilling wastes other than organics to minimize negative impacts on climate change and acidification, and recycling as a means of least impact and emissions savings (particularly the recycling of ferrous metals, construction materials, and slag) (Tan and Khoo, 2006).

2.2 Environmental Education and Awareness Programs

Sri Lanka has a literacy rate of 90.7% (Gunawardena, 2006). The Constitution of Sri Lanka guarantees the right of all citizens to “universal and equal access to education at all levels” (Article 27 (2)h, 1978). Education is compulsory for children ages 5-14 years since 1998. Technical and vocational training is available to students in order to develop marketable skills but there is no structured emphasis on issues of sustainability (Gunawardena, 2006). Although education is made available to all Sri Lankans, it is failing to create employable graduates. Unemployment is a major problem in Sri Lanka and has been cited as the cause for unrest and even violence (Gunawardena, 2006). In an attempt to correct this, technical and vocational training were introduced, as well as the subject of Life Competencies. Due to a lack of clear objectives, syllabuses or curriculum, and a failure to integrate these subjects with other subjects there has been a low success rate in transmitting the practical skills to students.

The National Education Commission in 2003 found that there was no “evidence that concepts relating to peace education, national harmony, democratic principles, human rights, gender equality and environment conservation” were being integrated into curriculum. Concepts are transmitted primarily through lectures and textbooks; it was the Commission’s recommendation that participatory methods of teaching be utilized to be most effective (Gunawardena, 2006). For the most part the educational system, which is written into the Constitution of Sri Lanka and which is available to all Sri Lankans, is not effectively integrating the concepts of sustainability, environmental concepts and responsible citizenship into its

methodology and curriculum. This is an opportunity lost as well as a potential waiting to be explored.

Swedish research on education and sustainable development, by Wickenberg, Axelson, Fritzen, Hellden and Ohman, reveals helpful insights into how to make education (specifically environmental education) practical, understandable, more effective and sustainable. In their book, *Learning to Change Our World*, the authors discuss the “formation of educational knowledge” and the “norm supporting structures” necessary for building towards environmentally sustainable development. The concept of ‘norms’ in this context is ‘action directive’ or ‘action direction’ and is part of a methodology that starts from a habitual action pattern and moves backwards to analyze why things happen. From there the analysis looks at what or who is supporting or obstructing the creation, development and maintenance of the norms (Wickenberg, et al, 2004). This research suggests the “individual and personal basic values, desire, feelings and commitment play a large and probably decisive part in the individuals’ environmental work, and therefore also their norms and normative actions” (Wickenberg, et al, 2004). When these values, etc. are combined with a basic understanding of the environment and active participation, environmental education becomes more effective and sustainable.

Integration of the environmental concepts into traditional and familiar routines and structures, that incorporates participants’ past experiences and future desires will help to assure continuing participation. Communication and ‘collective dedication’ yield a more positive response from all participants than ‘individual dedication’ alone (Wickenberg, et al, 2004). Based on this research, Sarvodaya is in an ideal position to create a sustainable learning structure that can incorporate environmental education into all levels of the society.

Involvement of women is also important. This research showed that where the context was dominated by women, more progress was made in initiating environmental themes. Sarvodaya village awakening programs emphasize the involvement of women in groups such as the Mother's groups, the Pregnant mothers groups and the Montessori programs; these are existing structures that can be expanded to involve women more integrally to the education process and positions of responsibility in the Environmental committees that would oversee Solid Waste Management in communities, as well as within the households. Small business enterprises can offer financial independence to women who are in situations where the husbands are irresponsible with income or where there are no men within the family as breadwinners. Financial independence for women can contribute to ensuring education for the children and to the minimization of domestic violence.

It is crucial that institutions undertaking environmental education be aware of the organization of subject, staff and time in order to support the environmental theme throughout the entire structure. Environmental education can lend meaning to the institution as a whole, and to all individuals working within the institution while serving as a link between the organization and local communities. In other words, the institution must practice what it preaches at all levels; in this way the two may support and enhance each other while expanding the relationship out into the surrounding community structures (Wickenberg, et al, 2004). Environmental education programs can be initiated with the support of a few dedicated or key individuals and then, with supporting structures set up at a local level, can be integrated into the larger community and taken up as a collective responsibility. The educating institutions must be dedicated to the concepts of sustainable development and environmental education in order to establish internal and external credibility. Meanwhile, an

expectation and set of goals can then be developed to cultivate public awareness of environmental concepts and consequences.

Along the lines of Paulo Freire's philosophy, education is seen as most effective when it is "co intentional" (Ahlstrom, 2006). In order to create a co intentional learning environment, students and teachers engage in learning at multiple levels and in multi-directional dialogues between learners and teachers. Learning becomes an egalitarian event that creates new understandings of the world based on past experiences and future imaginings rooted very much in present hands-on curriculum built on time spent in the garden, in recycling projects that incorporate science, arts, crafts, games, income generation, and other activities.

"Curriculum includes not only the entirety of activities, methods, materials, and physical and social environment of the whole learning center, but also the dynamic processes that shape and change these components. Multiple bodies and forces, for example, the staff, the broader sociopolitical forces, a program's funders, the students themselves, as well as community and national or international events, shape these processes." (Ahlstrom, 2006).

Schools can be viewed as forums for socialization and discipline, vehicles for social and cultural transformation and a means toward democratic empowerment of both students and teachers (Wickenberg, et al, 2004). Education is a significant factor in the UNCED Agenda 21 sustainable development plan, and is one of three forms of social influence employed to create social change; the other two forms are "market or economic" and "political or administrative" (Wickenberg, et al, 2004). Programs involving education and the environment, both of which are Millennium Goals, are highly likely to receive funding.

As far as developing norms that support environmental education and behavioral change, it is important to transmit a basic understanding of holistic systems upon which new 'activity patterns', or norms can be based, and a larger commitment to these norms within which individual and community behavior can find the support

needed for sustainable change. Clear goals for the education will guide the direction taken and will ensure continuity and cohesion of concepts (Wickenberg, et al, 2004).

Communication is a key aspect of establishing clear goals that are understood and ‘owned’ by all stakeholders. Awareness of environmental issues does not guarantee there will be action and commitment sufficient for behavioral change; multi-directional communication and community participation in all phases are needed for true investment (Dela, Goldstein and Cowasjee, 2006). All too often communication is seen as a means for convincing others to follow a particular path. “Interactive communication” is important so that “feedback and learning become the main forces” at work (Dela, Goldstein and Cowasjee, 2006). Merely creating awareness is not enough to effect behavioral change; “dialogue and participation aimed at ownership are essential . . . linked with other tools such as economic incentives and legal frameworks...especially when there are economic or structural barriers to overcome (Dela, Goldstein and Cowasjee, 2006).

2.3 Health Impacts

A brief summary of literature reviewed shows that there is reason to be concerned for human health in relation to SWM, and particularly the burning, burying or dumping of plastic wastes. It has been proven that plastics contain endocrine disrupting chemicals that can cause birth defects, immune system suppression and cancers, especially in infants and children (Levitan, Cox, Clarvoe, 2005). The active ingredient in plastic that causes these health problems is called di-n-octylphthalate and is an odorless, colorless liquid used to keep plastics soft and flexible. It can enter the environment, and as a result human and animal tissues, in many ways including improperly lined or unlined landfills, burning trash and wastewater. It sticks tightly to soil, sediment and dust particles, making it hard to eliminate from the environment

once it has been released. It can accumulate in animal tissues and be ingested by eating those animals, or the animals that eat them and once in the human body can impact the reproductive organs and unborn children (Public Health Statement, 1997). Many chemicals are not tested for endocrine disrupting properties and one cannot assume that something is safe simply because it is on the market.

Burning garbage is a serious problem for human, and animal health. Burning of garbage creates many chemical reactions that release toxins into the air. Slow burning fires are particularly dangerous because of incomplete combustion that releases toxins low into the atmosphere where it is taken in, undiluted, through normal breathing. There is no type of burning that is completely safe, but the burning of plastics, household chemicals, and construction debris is particularly dangerous. The longer you are exposed to 'backyard burning' the more damaging the effects to your lungs, nervous system, kidneys and liver.

Burning plastics containing PVC has been proven to form hydrochloric acid in the lungs; dioxins and furans can also result and are known to cause cancer when either inhaled or taken in through food products. PVC is generally marked with the number '3', PVDC by the number 4 and is found primarily in clear food wrap (lunch sheets). PVC is used to make plastic bottles and jugs, children's toys, drainpipes, vinyl fabrics, cosmetics, pharmaceuticals, household flooring and siding, and blister and shrink wraps found as packaging on many modern consumer items. Burning of PVC and related plastics produce carbon monoxide, dioxins and chlorinated furans; these are extremely dangerous chemicals because they are linked to cancers and birth defects and the dose required to cause such health issues is lower than any other man-made chemical (Backyard Burning, 2006).

Children are at greater risk to the health hazards (bronchitis, emphysema, cancer) because they absorb a proportionately larger amount of toxins than do adults, and because their nervous systems are not fully developed and these toxins can inhibit healthy formation of organs and other bodily systems (Backyard Burning, 2006).

2.4 Sarvodaya

Sarvodaya is a non-governmental, non-sectarian, voluntary service organization founded by Dr. A.T. Ariyaratne in 1958 and incorporated by Parliamentary Act Number 16 in 1972. Today it is the single largest people's movement in Sri Lanka with linkages at a global level. Sarvodaya is active in over 15,000 villages in Sri Lanka and has 559 full-time employees and thousands of volunteers. It is based on the Gandhian philosophy of non-violence and the teaching of the Buddha. Sarvodaya focuses on social awareness, welfare and community development through collective social action. A typical Sarvodaya village is comprised of a network of multiple social groups through which a wide range of economic and social services are enacted in the communities. A key aspect of the development methodology is the preschool and Early Childhood Development programs that are some of the first structures to be implemented.

The Sarvodaya community development model emphasizes a learning process that is designed to empower the powerless and to give the people power over their own choices in “social transformation, economic growth and technological enrichment” (Sarvodaya Annual Report, 2003-2004). Some of the key concepts in the Sarvodaya philosophy are that “Material change has to be accompanied by personality development”; “change becomes sustainable development when it is good, comprehensive and integrated”; factors affecting the personality include the environmental, biological, meta-physical, and mind; a major outcome is attitudinal

change; material outcomes include satisfaction of the “Ten Basic Human Needs” including Environment, environmental conservation, and employment to meet basic needs (Perera, 2006).

Sarvodaya possesses many tools to effect change at the individual, village, national and global levels. Some of these tools include: social empowerment programs, community capacity building programs, Shramadana campaigns, early childhood development programs, development of self-reliance programs, children’s and youth groups, information technology units, community health programs, anti-malaria projects, biodiversity and environmental conservation programs, economic empowerment programs, small enterprise development centers, Sarvodaya Women’s movement, national awakening programs, street children and women’s rehabilitation centers, and global awakening programs (Sarvodaya Annual Report 2003-2004). Global partnerships include: One World One People (OWOP), Japan Asia Friendship Society (JAFS), Global Ecovillage Network South Asia (GENSA), Netherlands Organization for Sustainable Development (Novib), and Novartis Foundation for Sustainable Development (Sarvodaya Annual Report 2003-2004).

Early Childhood Development Programs (ECDP) are established as one of the first steps in every community development project. These programs aim to “promote optimal physical, intellectual and psychosocial development in early childhood.” Mothers’ groups are another building block and focus on the well being of children. The village preschool combines both of these fundamental structures, and involves the mothers, children and community in the total development of each child’s personality along the principles of the Buddha’s teachings (Annual Report, 2003-2004). The ECDP, youth groups and mothers’ groups are excellent starting points for

Sarvodaya to begin introducing environmental concepts and programs into their village awakening projects.

A recent project undertaken by Sarvodaya is the Telecentre Program, a nation-to-village-to-nation Information Technology Unit (ICT) through which information is routed from the village information network hubs to links with the Global Village and vice versa. This program offers tremendous promise for nation-wide environmental awareness and education campaigns, as well as serving as a coordinating, monitoring and supportive entity to improve cohesion of efforts to minimize duplication of efforts and gaps in service provided.

The ICT mobile unit program, launched in January 2003 under the sponsorship of the Nippon Foundation of Japan, is an exciting possibility for even broader penetration of information and offers the additional benefit of practical training for the country's youth (Annual Report, 2003/2004). Sarvodaya's economic development programs and leadership training programs, including the ICT programs, offer the promise of alleviating poverty and lack of awareness. The Sarvodaya Street Children and Women's Rehabilitation And Development Education Center in Borella (Colombo) is one place where waste management efforts could be combined with community service and economic empowerment. The One World One People (OWOP) Program (Annual Report 2003-2004) is another avenue for initiating and implementing community based training, awareness, education and employment programs specific to the SWM issue. With a conscious focus on solid waste and environmental issues, these and other programs could have a significant impact on the status of the solid waste management problem in Sri Lanka.

The Community Health Unit project works to provide basic health care and also to go beyond the basics to encompass preventative care (Annual Report, 2003-

2004). With support from the United Nations Population Fund (UNFPA), this program is another avenue through which awareness building and training can be presented to communities to minimize health risks associated with unsound waste management practices. Combined with resources and expertise in the Ministry of Health and Education, the Sarvodaya Community Health programs could make a substantial difference in people's behaviors and health status. This will not only benefit them, but will have a positive economic impact on the country.

3. Methodology

This inquiry and research were qualitative in approach and employed formal and informal interviews, focus groups and questionnaires. Initially I spent several weeks in the research villages of Wadduwa, Thalpitiya and Lagoswatte building relationships with the community while observing daily life and community structures. Special attention was paid to learning about the villagers' routines, relationships, culture and histories as well as their behaviors and attitudes pertaining to garbage generation and disposal.

In addition to the garbage measurement project, environmental education trainings were conducted by a Sri Lankan environmental organization; basic skills such as waste reduction, reusing of plastic bottles and bags, recycling of glass, plastic and metal and composting were covered. An overview of the environmental and health risks of inappropriate waste disposal, and an informational component to advise participants of recycling facilities and other resources to assist them in managing their solid waste were incorporated. Participants were encouraged to form their own environmental task force responsible for upholding the commitment of environmentally sound solid waste management in their communities.

3.1 Garbage Measurement Project

Waste generation and composition were measured for 13 families from Wadduwa and Lagoswatte Sarvodaya villages. Wadduwa is a tsunami-affected, coastal, semi-urbanized area, approximately 5 km. from Panadura city; Lagoswatte is a rural, inland tsunami family relocation Eco-village.

The Sarvodaya Shramadana Society leadership in each village was asked to choose approximately 6 households (a total of 13 ultimately participated) to voluntarily participate in a six-week project to measure the amount of household garbage generated daily. Different income and education levels, and varying degrees of investment in Shramadana Society activities were factors considered in selection of families. Participants filled out a pre-project survey designed to ascertain: interest in the issue of waste management, degree of environmental awareness, importance placed on clean and beautiful environment and concerns that could be addressed in the project (Appendix Three). A final survey was conducted to: gauge satisfaction with the project, increased awareness, behavioral change, and to obtain details about family size, ages of family members, income level and division of labor and responsibility in the family (Appendix Five). Questions addressed knowledge of health and environmental impacts of burning of plastics, dangers of inappropriate disposal of polythene, awareness of recycling and reduction methods, overall concern with the issue of waste generation and disposal, gender division and personal aesthetics.

Waste was collected three times a week over a period of six weeks. Families were instructed to collect their garbage as they normally would. Together we then sorted it into categories of organics (food wastes, plain paper, hair, etc), hard plastics, polythene, paper, glass, metal and other. Each category was weighed, in kilograms, on an industrial kitchen scale. Quantities were entered into tallies that noted the number of days of accumulation, number of household members and village. Participation between families was not consistent so data was equalized by totaling the amount of garbage for each household, dividing that by the number of days accumulated, divided by the number of people per household to obtain final numbers. This gave a

daily, per person accumulation; to obtain the average daily generation per village, these totals were then divided by the number of participating households. When measuring garbage, inconsistencies arose between households or weeks as well as absence of certain types of waste such as metals and glass. Additional information was gathered at these times, such as food wastes being given to neighboring pigs, arrangements with metal and glass scavengers for weekly pick-ups, etc.

Results from the measurement program can only be used as a rough estimate of quantities being generated in villages; it is unclear whether families gave all of their garbage or if they might have held back items they felt were less acceptable. Even though efforts were made to remove judgment about the composition or quantity of waste generated, participants may have formed their own ideas after trainings and information sessions. Also, weights are slightly inconsistent because the project took place during the rainy season and some days the waste materials were wet.

Participation was a bit erratic among some families. By equalizing the data these inconsistencies are minimized, but there is surely some margin of error remaining. Still, the project gives some indication of quantity of waste generated at the village level and also some idea of proportions of materials being disposed of. More importantly, and practically, the time spent in the villages and with the participants gave valuable insight into the challenges villagers face in dealing with their waste, and the impediments to successfully changing behaviors.

3.2 Interviews

In both villages, an initial focus group interview was conducted in Sinhala, translated by Mrs. Badra Rodrigo, in order to gain insight into the starting level of awareness and knowledge about solid waste management, and attitudes about the relative importance of garbage. Families who had been chosen to participate in the garbage measurement project were present at this meeting. Answers were translated into English for this paper. On the last day of measurements another questionnaire was administered to participating families, individually. Final data was translated into Sinhala; the researcher presented the data to the families and community in a final ceremony; Mrs. Rodrigo translated the presentation into Sinhala for the communities. Questions, answers and final data can be found in Appendixes Three through Six.

Interviews and informal conversations were conducted at various agencies, organizations and government offices in order to gather information about responsibilities and programs pertaining to solid waste management. Offices and organizations visited include: CEA, EFL, IUCN, Practical Action, IOM, ECO-V, Sarvodaya, Kalahari Plastic Recycling Services, Panadura Divisional Secretary, Thalpititiya Grama Sewa Nildari and the Wadduwa PHI.

3.3 Literature Review

To gather data from Sarvodaya I researched in-house generated literature and spoke with unit and district coordinators. Personal observation in Sarvodaya villages and discussions with outside agency employees contributed to an understanding of Sarvodaya's approach to, and potential role in, waste management and environmental education. I was interested in discovering Sarvodaya's perspective on the importance

of garbage reduction and management, what projects are currently underway, what projects have been conducted in the past, and what they feel are the most pressing needs in relation to garbage management.

An extensive literature review of Sri Lankan government documents pertaining to the environment and waste management was conducted and meetings with numerous in-country private waste management service providers, as well as non-governmental, intergovernmental and governmental organizations involved in waste management and environmental education contributed to the research.

World Bank documents, international environmental journals and documents pertaining to waste management projects in other tropical countries (specifically small countries such as Bali, Korea and Singapore) were researched to shed insight, reveal gaps and provide suggestions to inform this inquiry

4. Presentation and Analysis of Data

Data for this inquiry was gathered at several levels of society and by various methods.

4.1 Garbage Measurement Project

To gather information at the grassroots level, I spent a period of six months in two tsunami affected villages: one was semi-urban and coastal while the other was a relocation village in an inland, rural setting with tsunami affected families from several villages. I conducted a garbage measurement project with a total of 13 families selected by the Sarvodaya Shramadana Societies. Garbage was collected daily, separated and weighed. Totals were divided by number of days collected, number of family members and then averaged to obtain average per person/per day totals generated daily.

Village	Material	Week One	Week Two	Week Three	Avg PP/PD
Lagos	Organics	37.3g	46.94g	27.8g	37.35g
Lagos	Paper	6.45g	3.64g	8.2g	6.10g
Lagos	Polythene	12.24g	10.83g	14.83g	12.63g
Lagos	Plastic	2.75g	1g	18.48	7.4g
Lagos	Glass	4.6g	3.5g	8.1g	5.4g
Lagos	Metal	10g	1.1g	5.4g	5.5g
Wadduwa	Organics	166.6g	81g	0	123.8g
Wadduwa	Paper	8.4g	8.6g	0	8.5g
Wadduwa	Polythene	14.9g	12.5g	0	13.7g
Wadduwa	Plastic	3g	3.4g	0	3.2g
Wadduwa	Glass	0	0	0	0
Wadduwa	Metal	0	0	0	0

Table One
“Averages of Daily Per Person Garbage Generation in Two Villages”

I had hoped to be able to reveal behavioral change before and after environmental education workshops through a trend of reduced quantities of non-

recyclables, however this was not fully possible due to the inconsistency in participation and the short time frame between the beginning of the project and the first workshops. My observations informally revealed efforts to reduce the amounts of polythene and other non-recyclables, as well as a desire to have other options beyond burning garbage. Families were deeply concerned about the health risks of burning garbage, and of their neighbors continuing to burn. Comments made showed willingness to separate wastes and to participate in recycling efforts. The garbage measurement project gave me the opportunity to observe families' perceptions of garbage and their methods for dealing with disposal. It also was useful in showing the composition of rural garbage as far as percentages of recyclables, organics and non-recyclables.

The data shows the largest percentage generated is organic in composition; in general this is food waste from cooking and over-preparing. One participant explained the food wastage as a cultural phenomenon, stating that it is polite to have food to offer visitors and so she always prepares extra in case of unexpected company. In some villages local pig farmers pick up food wastes to be used as fodder. Families keep food wastes in a covered bucket and the farmer comes by each evening to empty the buckets into a large container. Organizing similar arrangements in more villages would be an inexpensive and relatively easy means of disposing of food wastes.

Composting is another solution but previous projects have been only moderately successful (Pilapitiya, 2006). Based on my research this is a result of inadequate training and follow-up, but Sumith Pilapitiya of the World Bank suggests that part of the problem is a lack of commercial returns (Pilapitiya, 2006). In addition, families are generating low quantities of waste daily and it is primarily wet food waste. Meat products are mixed in with vegetable and fruit wastes, which presents a

health concern, especially because the piles are not achieving sufficient levels of heat to kill pathogens that might be present in the meats. There is a disproportionate amount of nitrogenous to carboniferous material for the compost bin to efficiently decompose the materials. Consequently families complain of a bad smell from the bins and an increase in flies and other pests. Compost bins are usually in close proximity to the homes (particularly the kitchens which are often situated at the backs of the houses) and the flies are a significant nuisance and potential health hazard. The fresh food wastes also attract numbers of crows, dogs and other animals. In Lagoswatte, Sarvodaya has provided families with ferro-cement, covered composting bins and this seems to be successful in reducing flies and other pests but does not necessarily address the issue of proportions and adequate quantities of waste for efficient composting.

One remedy to this issue would be to combine the wastes of several households in one shared bin so that more wastes are being added each day. To this the yard sweepings of dry leaves and other carboniferous materials could be added, and animal manures could be collected for nitrogen. However, when I suggested this to the Central Environment Authority (which has a program of distributing household compost bins) they explained the families do not like to share bins because of the problem of monitoring inputs. Apparently there is considerable difficulty in getting families to work together. The culture is such that families are insular and concerned only with their own yard. This has ramifications on a large scale as well, but in an immediate sense it makes household composting projects unfeasible without first building community cohesiveness and cooperation.

Given the high incidence of unemployment in Sri Lanka (Gunawardena, 2006) perhaps a more workable plan would be to implement micro-enterprise medium-scale

windrow composting projects that are initially subsidized by the government, until a steady market can be established for the finished product. Rather than awarding these projects to large private companies, which has met with limited success, (Pilapitiya, 2006) Sarvodaya Shramadana Societies could organize village enterprises that would be maintained and monitored by the community, thereby increasing investment in the project and contributing to the uplifting of the community as a whole.

Potential markets for large quantities of compost could be cultivated with international and large-scale restoration and soil erosion repair projects. It is important to creatively manage the organic wastes generated in Sri Lanka. These changes will take time to organize and implement. In the meantime, simply removing food wastes from discarded garbage would make recyclable material recovery efforts easier and less hazardous for scavengers or other recyclers. It would also lower the risk to animals eating the food, and minimize the spreading of garbage from animals breaking into the bags. Incineration might also become a more viable option if the moisture content of the waste were significantly lowered.

The next highest percentage in the garbage measured was polythene. It is important to note that this is by weight and to remember that polythene is very lightweight. Individual serving sachets of shampoo, laundry detergent and food stuffs make up the bulk of discarded polythene.

According to Mr. Anura of Kalahari Recycling Enterprises, one of the most significant contributors to the waste stream in recent years is the single use sachet. Sri Lanka does not currently have the ability to recycle these. Participants explained the sachets are more affordable than large sized products, so this is an economic factor that needs to be considered when looking at ways to minimize the use of these packets. In addition, popular media glamorizes these sachets in advertisements on billboards

and television. One example is a television advertisement that shows an attractive, young, modern couple racing down the highway on a motorcycle. The man's hair is blowing into the woman's face so she climbs onto his lap and applies some hair gel. The next frame shows her happily snuggled up to the man as she tosses the single use packet carelessly onto the freeway as they speed away into the sunset. This is one of the unfortunate aspects of the modern, "disposable" consumer culture that is coming into Sri Lanka with development and its 'modernizing' influences.

Solutions to the rising consumption of single use sachets would be to introduce cooperatives that villagers would contribute to in order to purchase commonly used brands in bulk and then divide them up into smaller, re-useable containers. Another, or additional, option would be for the local boutiques to purchase bulk and sell small, affordable quantities in re-useable containers. Both of these solutions can be easily introduced by an organization like Sarvodaya and would ultimately save the communities money while reducing the non-recyclable waste stream.

Ideally awareness and education programs would accompany initiatives such as these to create investment and markets for these bulk products. Using low phosphate, biodegradable, "green" products would be the ideal choice but it may take time to build market acceptance for them. The economic incentives offered by Tri-Nature Products out of Australia (see Resources) might offset the loyalty to branding and packaging. Tri-Nature Products can be purchased in bulk, imported in large quantities by Sarvodaya and sold at cost to boutique owners or cooperatives. Tri-Nature also offers dealerships that further lower the price of products and earn commissions for product sold. Each village could become a dealer under Sarvodaya and earn commissions for their Shramadana Societies as well as for the Sarvodaya

movement. Financial incentives such as these are critical in the sustainability of behavioral change

Sili-sili bags and polythene shopping bags were the next highest component in the measured garbage, closely followed by lunch sheets. By and large, every market stand, boutique and shop generously packages purchased items in these bags. Lunch packets are automatically wrapped in lunch sheets, and sit down “hotels” place plastic on the plate; this is to minimize transmission of diseases such as salmonella and hepatitis so this is a health concern that needs to be considered when looking at alternatives.

In the villages researched, garbage is generally put into polythene shopping bags and set out on the road or disposed of along the railway tracks. Food wastes, plastic, batteries, etc are mixed in the bags. Animals tear open the bags to get to the food and often end up eating the very thin lunch sheets. Countrywide this has caused deaths among elephants, water monitors and domestic animals. The scattered food wastes also contribute to increasing populations of crows, street dogs and cats and rats. Because pick-up is irregular, and drive-by drop offs common, the wastes accumulate on the roadways. Once a week, on an average, the scattered garbage is raked into a pile and burned. It is usually the women of the village who take care of the garbage, in close proximity to the fumes and smoke released by the slow burning plastics, batteries, polythene, and other toxins.

There are very few waste receptacles in which residents can place or store garbage and recyclables, and those that are given or purchased are often stolen; the issue of garbage storage and security are issues that need to be considered when looking at accumulation of wastes, other than plastic bags, for weekly pick up. Large cement containers with metal lids might, for example, be a viable alternative. Due to

the high incidence of outsiders dumping their garbage, these containers may need to be padlocked so that only residents have access to them.

Quantities of metal and glass were low which could be misleading. Based on observation and conversations with villagers, this is most likely because villagers do not often purchase canned goods or other metals and bottles are returned to the boutiques for refunds. In the last week of data collection one of the Wadduwa families explained, when asked why they never had glass or metal products, that a local scavenger comes by once a week to pick up them up for recycling.

Local scavengers pick up scrap metal and glass on a regular basis because the return on them at recycling centers is high. For example, a “bottle and paper” collector in Colombo who goes around on a bicycle collecting newspapers and glass pays householders a small fee (around Rs8 per kilo for newspapers and Rs1-2 per item of glass) and earns up to Rs3 per kilo for paper and 50 cents to Rs1 per glass item (Fernando, 2006). An average scrap metal collector can earn between Rs 400-700 per day in Colombo. The average unskilled laborer earns around Rs 450 for a day of hard physical labor (Pilapitiya, 2006). This kind of symbiotic relationship can be facilitated, and supported, by the sort of community structures that the Sarvodaya movement already has in place in over 15,000 Sri Lankan villages. Partnerships of this sort serve the important dual purpose of providing income as well as diverting waste from the stream headed to overburdened, unmanaged landfills and wild dumps.

Quantities in Lagoswatte were higher, though still not as high as might be expected. The Lagoswatte villagers were holding aside recyclables in anticipation of being paid for them by the recycling company contracted to pick up from the village. Soda bottles are returned to the local boutiques for refund. The fact that these informal arrangements are in place, and functioning smoothly, is encouraging when

considering other recycling projects. Factors that makes these arrangements successful include: consistent pick-up on known days, economic incentive, ease of use by residents, and these items are generally clean and do not attract pests.

4.2 Questionnaires and Interviews

Questionnaires and conversations with families over the course of the garbage measurement project yielded a wealth of information about the practical difficulties the public faces in regards to solid waste management.

Results from the first, baseline questionnaire in Wadduwa showed that the primary means of disposing of garbage was by burning it, or if not burning then placing on the road where, in the absence of consistent municipal pick-up service, it was being burned by someone else once a week; participants felt that garbage is an issue of concern in Sri Lanka but feel it is more an issue in the urban areas than it is in rural areas; participants felt that their village was clean but that other villages were not; participants were unaware of what recycling was, were not recycling, and were interested in learning more about how to recycle; participants were willing to form environmental committees to deal with the garbage issues in their own villages (the primary concern being drive-by dumping by outsiders); participants were aware that garbage created disease by attracting vectors; participants were interested in environmental workshops and were particularly interested in learning how to properly compost their organic wastes; most participants answered questions by looking to one another to see what others were answering (Appendix Three).

The first questionnaire in Lagoswatte showed participants knew what recycling and composting are; participants were motivated to earn income for the Shramadana Society by recycling their wastes; participants were aware that garbage created disease by attracting vectors; participants were not interested in forming an

environmental committee because Sarvodaya was already taking care of that as part of the Eco-village plan; participants answered questions as one person rather than individually and answers seemed to be influenced heavily by a recent environmental workshop conducted by Kalahari Recycling Enterprises and Sarvodaya (Appendix Four).

Results from the final questionnaire showed that participants in both villages had enjoyed the project and felt they had learned a lot about waste management. Participants felt that separating their wastes was easy to do and was not overly time consuming. Participants were aware that burning their garbage was dangerous and were reluctant to continue burning. Participants were experiencing difficulties in properly disposing of their garbage due to a lack of facilities. In Lagoswatte participants were a bit disillusioned because the recyclables had not been picked up and dogs had scattered the accumulated items. In both villages participants were having difficulty impacting others in the community because of resistance, on the parts of fellow villagers, to being told what to do by the participating families. In Wadduwa the participants were concerned about fellow villagers burning their garbage but were unable to get those neighbors to stop burning because it is what villagers have always done and without the knowledge of the dangers of burning plastics they see no reason not to do it.

A major concern and frustration in both villages was the drive-by drop offs of garbage by outsiders. In both villages there was confusion about how to properly compost and concern about the number of flies that seemed to be drawn to the compost bins. Boutique owners were willing to try the idea of buying bulk and selling in small quantities, if someone would help them make the initial investment in the bulk products and the purchase of reusable containers. Participants in Lagoswatte

were interested in micro-enterprises such as composting and papermaking (Appendices Five and Six).

In both villages, participation in the workshops was very high. Feedback on the workshops was positive. Participants expressed the desire for more workshops in the future and for programs to be conducted in the schools.

4.3 Discussion of Interviews

Questionnaires and informal interviews conducted with participating families and villagers revealed interesting insights into why environmental awareness and education programs have been less than satisfactory and have tended to have short-lived impacts. Decisions for interventions are generally made at an institutional level and then implemented at a grassroots level. Most interventions consist of introducing new technologies, such as compost bins or recycling bins, and environmental concepts that are intended to alter behaviors of the audience (schoolchildren, villagers, etc.). These are examples of “top down” decision making and involve very little in the way of follow up or support services.

Individual investment in these projects among villagers is low since their involvement in decision-making and implementation is generally minimal. Had they been consulted, some of the issues they would raise would be:

- ❖ Decisions for interventions are generally made at an institutional level and then implemented at a grassroots level.
- ❖ Most interventions consist of introducing new technologies and one time trainings which are not backed up by adequate training, support or follow up.
- ❖ Top down decision means individual investment in projects (among villagers) is low.
- ❖ Families are interested in trainings and education but want the topics to be based on their interests and things that are useful to them.
- ❖ Educational programs need to be backed up by adequate infrastructure. (Ex. If they are taught how to do recycling then they need some way to get the recyclables to the buyers, or to have consistent pick up)

- ❖ Financial incentives are motivating. Most people are interested in earning money for their Shramadana Societies so they can improve their communities.
- ❖ Services are not consistent and are not available to everyone (inconsistent pick up is worse than no pick up at all because it discourages people from coming up with their own solutions as they wait for someone else to take care of the problem. There was a general sense that garbage management was “The government’s responsibility.”)
- ❖ Without consistent pick up of recyclables, families will not continue to separate their trash. Bags of recyclables sit for weeks waiting for pick up and get torn apart by animals and attract mosquitoes and flies.
- ❖ Most villagers cannot get large quantities of bottles, plastics, etc to the few recycling centers on the island since most do not own vehicles.
- ❖ Though most families were very interested in composting, they don’t know how to do so properly and they get flies and other pests in the house as a result.
- ❖ Most families do not generate enough organic matter to create enough heat in a compost pile to adequately break it down into usable compost AND they don’t want to share compost bins with their neighbors because they think their neighbors won’t take good care of the bins.
- ❖ The compost bins that have been given out were given with one training that was not hands-on; most people still felt they did not know how to compost properly. After getting flies and other pests, many families decided to use their compost bins as burn containers for burning trash.
- ❖ Some families were interested in the idea of doing large scale composting as an income-generating venture but land is not readily available and they would need assistance buying the proper equipment.
- ❖ One of the most often expressed frustrations was that outsiders dump trash on their streets. They worry that even if they do organize themselves to recycle and manage their trash that outsiders will still continue to dump trash and then they will have to clean up after others as well.
- ❖ It is hard for them to share the knowledge they have gained from the trainings because other villagers don’t like to be told what to do by peers. They say it is more effective if someone from the outside comes in and tells them. (My observation though is that they won’t maintain changed behavior without a community driven structure to monitor and support/encourage the change.)
- ❖ One family told me that the older residents in their village refuse to stop burning their garbage because they have always done so and see no reason to stop now. This family member told me she feels very worried now that she knows it is not healthy for her children but she can’t make the other people stop burning their trash. If she says anything then they will cause her trouble.

Recycling service providers need to have adequate materials to pick up on a regular basis in order to make financial sense for them. However, from the villager's perspective, there need to be consistent, well-established pick-up dates. A network of village level collection of recyclables taken regularly to a central location makes sense for all parties: it is income generating at the village level, ensures consistency and reliability of pick-up, and ensures larger quantities for the recycling facilities.

The most successful projects have been community based and have involved multi-stakeholder partnerships. The Maldives has recently undertaken a waste management project involving the reclamation of land with garbage. This effort, combined with a national campaign of garbage sorting, involved the Ministries of Health, Environment, Home Affairs and the media (Waheed 2006).

In Mussoorie, India, Vipin Kumar organized rag pickers and poor people to sort through garbage and sell the recyclables to scrap dealers. It took years of meetings and support services combined with an extensive educational campaign and market creation, but now the city that was once drowning in plastic is clean and the previously unemployed poor are earning respect and incomes (Ghosh, 2000).

In Galle, Sri Lanka a local foundation and USAID funded project has trained local women to create small collective groups that collect, clean, sort and sell plastic and paper to recyclers. USAID helped finance a recycling unit that turns plastic waste into pellets, increasing the plastic's value from 3.5 cents per kilo to between two and fifteen times that. The collective has saved over 10,000 rupees through the project while cleaning the beaches and streets of discarded plastics and paper. The project has increased social harmony, improved the condition of women and children and

improved community health by keeping plastic out of slow burning, dioxin releasing burn piles (USAID, 2006).

Numerous times, in interviews and discussions, I was told that Sri Lankans are very good at writing reports and national plans but very poor at implementing them. This seems to be a result of poor linkages and failure to combine efforts. Consequently duplication of efforts, wastage of funds and poor follow up are the norm rather than the exception. Monitoring and evaluation of projects also seems to be lacking so there are no clear measurements of success. A 2003 World Bank project intended to improve environmental conditions in Colombo was judged to be unsatisfactory by the Operations Division of the WB. This was due in part to the conflict situation but other reasons given were a lack of baseline measurements, inadequate resources and failure to follow through.

“Without clear baselines and a clear understanding of the counterfactual it is difficult to discern the development purpose and the development achievements of the operations. “
“Sustainability is rated as unlikely, principally because of the lack of ongoing maintenance . . . and the absence of financing mechanisms to help pay for it.”
(Performance Report, 2003).

Coordination of projects is non-existent for the most part. This phenomenon was mirrored in the villages through the insularity of families. Repeatedly I was told that people were only concerned with their own yards and so long as the garbage was out of their backyard they were not concerned with it, even though it littered the common thoroughfares. After a community-mapping event, when we asked the participants how the event had been different from other needs assessments that had been conducted in the past, several community members said that they had, for the first time, gotten a sense of the village as a whole and were aware of other people's situations outside of their own compounds. This seems to be a recurring theme in Sri Lanka that is impacting efforts to address the solid waste problem.

In general, the attitude at an institutional level toward the public is that waste management strategies are not working because the people are unmotivated, difficult to teach and unwilling to change their behaviors. It would be difficult to prove or disprove such beliefs, but the time spent in the villages conducting this research revealed the issue is more complex than that. Over a period of six weeks, and with a minimum of education, a noticeable change in attitudes and behaviors occurred among all of the families who participated in the project. There was a discernable uneasiness with the idea of continuing to burn garbage, a trend toward separating garbage into at least two categories of organic and non-organic materials, a trend toward garbage reduction, and a clear willingness to learn and participate in change.

Though the participants were all women and fully occupied with family maintenance and other work, all were willing to contribute to the project with their time and active participation. Most participants stated they had enjoyed the project and that they were interested in learning more about how to manage their garbage more responsibly.

5. Conclusions

Government, private business, urban and rural residents and foreign agencies all face impressive challenges in arriving at solutions to the solid waste management issue in Sri Lanka. Government faces limited resources and an ongoing civil conflict that demands attention and resources. Strategies and national plans are drawn up by educated academics that look good on paper but which fall short in implementation. Often these slick documents are never actually implemented due to a variety of causes. Most strategies and plans are dictated from the top down, with minimal to zero input from the people they most impact: the average citizens of the country. In addition they are ill informed of the realities of most people's lives and are therefore often unrealistic and prone to failure. Because communities are not involved in the process of defining problems and arriving at solutions the government, and other institutions, approach the situation with inadequate knowledge and weak public commitment.

In urban settings there is not enough land for each family to have a compost bin or to store recyclables; rats and other disease vectors tend to be more of a concern with bins and stored refuse as well. Many families do not own vehicles and rely on public transportation to move about. Recycling centers are not easily accessible for most residents. Carrying multiple bags of plastics, glass, etc on the bus is not feasible and many residents cannot afford a taxi or three-wheeler. Many areas do not receive municipal pick-up services. Neighborhoods that mobilize to self-manage their wastes often face the challenge of outsiders dumping garbage on their streets or in their recycling receptacles. Apartment dwellers face the challenge of other residents not respecting recycling bins; consequently wastes get mixed and are more difficult to

separate. On a positive note, urban dwellers can more easily make arrangements with rag pickers and other informal waste management providers.

Rural residents face the challenge of even greater distances to waste management facilities, and tend to have lower incomes and less expendable time and money than urban dwellers. Informal arrangements could be more challenging to arrange. Municipal services are rarely consistent and there is more open land upon which to dump garbage illicitly. It is difficult to control drive-by dumping of outsider's garbage. In rural areas there is the additional risk of unintended loss of biodiversity through wildlife eating garbage containing plastic and polythene. Wild animals can also be attracted to open dumping and crows multiply where there is garbage, thereby impacting native and endemic bird populations. On a positive note, rural dwellers tend to have access to larger plots of land where composting and recycling projects could be established. More remote villages could have centrally located holding bins that are less likely to receive outside, unwanted inputs. Also, in a village setting, coordination and cooperation can be accomplished more readily since most villagers interact closely on a daily basis, unlike urban areas.

From a marketing perspective, solutions for rural and lower income areas would ideally be connected to income generation and community support structures in order to fully integrate responsible solid waste management behaviors into day-to-day life and culture. In wealthier communities, solutions can be targeted towards civil responsibility and status since economic incentives have been shown to be less motivating (Bandara, 2003).

In the United States behavior change has been effected in the higher income populations by linking the behavior to status, personality factors and fashion. A culture of consumer items has been created around recycled and reused items. In

Berkeley, California the salvage store “Omega Salvage” is tremendously successful selling construction items that have been taken from demolished buildings. In many parts of the United States and Europe the most chic apartments and homes incorporate reused porcelain bathtubs, old light fixtures, Victorian doorframes, etc. Recycled papers, rag rugs, and plastics are fashioned into ultra-chic, high priced gift items and sold in upscale boutiques. Media and advertising have created a demand for these items that ensures a viable market for them. Similar strategies could be employed in Sri Lanka as it continues to develop, creating an affluent consumer population, particularly in the larger cities.

Any significant social change needs to occur within the context of individual attitudinal and behavioral change. The Sarvodaya movement builds individual awareness and cohesive communities that are based on principles of personal responsibility and shared labor. Highly respected and influential in Sri Lanka because of its non-partisan approach, longevity, depth and breadth of impact, continuity and coherence of mission and vision, and its vast network of village Societies, Sarvodaya commands an impressive support network securely in place throughout the country that can encourage, monitor and guide communities as they move through the stages of economic and social development. In addition, the international networks that Sarvodaya has cultivated over the past 48 years bring in significant funding for innovative and appropriate technologies that are firmly anchored in participative methodologies, ensuring a sustainability that few other organizations can attain.

Environmental awareness and stewardship are among the key principles taught by the Buddha, and the right to a clean and beautiful environment is one of the 10 Basic Human Needs, as defined by Sarvodaya. Because of the necessity of addressing the immediate needs presented by the devastating Tsunami of 2004, Sarvodaya has

not been able to focus as much energy as it would like on environmental issues, however it is a priority that leadership is anxious to develop (Dr. Vinya Ariyaratne, 2006).

Even though there is presently no dedicated environmental unit, Sarvodaya has undertaken multiple environmental projects including the Lagoswatte Eco-Village and The Development Education Institute at Tanamalvila. While these model villages are important as training centers and blueprints for future projects, Sarvodaya needs to take the next step and incorporate environmental awareness and stewardship programs into all their community development structures. Introducing this component into the Early Childhood Education, Mother's groups, Youth groups, Economic development programs and Technological Empowerment programs would require a relatively minimal investment and would yield tremendous results for the country. Organic community gardens, composting and recycling programs combined with early childhood education can combine primary school education with environmental awareness, enriching the one with the other.

There are excellent models for the incorporation of environmental concepts into educational curriculums. In Berkeley, California there is a world-renowned school garden project called The Edible Schoolyard where mathematics, science, language skills, social studies, and practical life skills are taught within the interactive context of the garden, and in undertaking recycling and reusing projects. The school has a kitchen where children learn to cook and then eat the meals they themselves have prepared with the vegetables they have grown.

Educational research suggests that environmental education is more effective when more of the senses are involved in learning and when students are able to learn in a holistic, practical manner.

“To form knowledge in a holistic way is about identifying relationships in the domain of knowledge. A holistic approach means in this case to bridge differences between different subject cultures and helps develop logical thinking.” (Wickenberg et al, 2004).

When we see, hear, touch, smell and move while learning, we are more likely to remember what we have learned, to understand at a much deeper level, and to feel a responsibility to act on the knowledge acquired. “There are no limits between theory and practice in “living knowledge”. This knowledge is engaged in questions as well as in answers, and deeply rooted in reality. . . knowledge is to be judged for its purpose in relation to action..knowledge as a basis for action.” (Wickenberg et al, 2004). The Edible Schoolyard project has inspired many other similar projects and has become a national movement in the United States. Similar projects could be implemented in Sarvodaya villages, especially in urban areas.

My research has shown that awareness and education are effective in altering perceptions and attitudes. The research suggests that this education is most effective when it is consistent and connected to people’s daily lives. For example, the garbage project I conducted taught families how to separate their garbage by involving the families in the weekly separation and measurement of their own trash bins. Together we sorted through the dustbins, and together came up with ways to make that process easier such as having separate containers for the various categories of waste. In spite of the willingness of participants to change their behaviors, the lack of consistent, accessible and adequate infrastructure and support services to enable positive behavior change eventually resulted in reduced motivation and an inability to sustain positive behavioral change. Therefore, it is essential that education and awareness training be combined with a well-organized and coordinated system of support services and incentives.

Sarvodaya has the ability to provide necessary spiritual and technical support systems in the form of community environmental task forces, childhood programs and youth environmental groups, mothers' environmental groups, mobile information units, practical degree programs in environmental fields, organic advocacy and promotion, small business loans to establish recycling staging centers, large scale composting projects, door to door recycling pick-up, food waste for livestock programs, paper making enterprises, and other creative, community based solutions to the problem of solid waste while simultaneously improving the lives of the people.

It is the conclusion of my research that other projects have failed due to a lack of coordination, insufficient community involvement at all levels, inadequate follow up and support services, and finally due to a failure to effectively alter the people's perceptions in regards to their responsibility for the situation. Sri Lanka has highly competent experts available to work in the field, adequate resource materials and excellent educational programs already developed, as well as a national strategy that eloquently outlines the government's role in achieving environmental sustainability.

What is lacking is a web of interconnections and linkages that Sarvodaya can provide. By involving the communities in creative, egalitarian ways and through the creation of collaborative partnerships with the Central Environmental Authority, governmental Ministries and other Sri Lankan and international organizations, Sarvodaya can be the catalyst for transformation that may halt the imminent environmental and public health disaster looming on the horizon of Sri Lanka's future.

One of the "Ten Basic Human Needs" as stated in the Mission statement of Sarvodaya is the "Right to a Clean and Beautiful Environment." However, without a dedicated unit and a clear plan for upholding the importance of environmental

responsibility, the transmission of such values will be erratic at best, and cannot be expected to have any sort of broad, long-lasting impact. This is an area where Sarvodaya could take the lead, along with other organizations such as the Artacharaya Foundation (see Resources), to exemplify sustainable, responsible environmental stewardship. In addition, moving into this realm in a systematic manner would open many avenues for incoming grant money and international recognition for Sarvodaya while helping to improve the health and happiness of the Sri Lankan people. On a more esoteric level, respect and caring for the environment may lead to the development of human beings who are, in general, more respectful of life and may help in the resolution of the civil and political conflict that is damaging the country.

In order to move forward with a sound solid waste management strategy, it will be important for stakeholders to discontinue blaming the other for the failures of efforts and to discuss the challenges faced by all sides. Every resident of Sri Lanka is impacted by unsound waste management practices. Dialogue between multiple stakeholders can lead to a mutual understanding of obstacles to and potentials for success. By involving all affected parties in the process, the country as a whole can begin to take responsibility for the issues faced. Sarvodaya can be an effective facilitator of this sort of multi-stakeholder, participative approach. ¹

¹ Judith Hermann, in her book *Trauma and Recovery* speaks to this by saying that recovery cannot take place in isolation. Building relationships becomes the vehicle for recreating psychological faculties that are damaged by trauma: trust, autonomy, and intimacy. These faculties can only be recreated through relationship. Dialogue groups can become partners in healing for individuals and their communities (Hermann, 1992). Sarvodaya is in a position to foster these kinds of dialogue groups that can focus on addressing the SWM issues of the country and build caring and a sense of stewardship of what are interconnected, shared resources. The “environment friendly person” that ECO-V seeks to create can also be an important aspect of building peace.

The people of Sri Lanka cannot wait for the government to develop solutions to the SWM issue; they must take responsibility for their garbage and develop appropriate, community driven solutions to protect their, and their children's, lives and futures. Sarvodaya is in a position to facilitate the necessary shift in consciousness, and behavioral change, that has so far failed to occur through other interventions.

6. Recommendations to Sarvodaya

(See also Appendix I)

Before giving recommendations that are clearly influenced by my own priorities and focus of my research, I would first like to say that Sarvodaya is currently undertaking a great many important projects for the well-being of the Sri Lankan people and that I realize Solid Waste Management may seem a small matter in comparison to National Peace and the aftermath of the Tsunami disaster.

Environmental issues are a key aspect of the Buddha's teachings, and of the Sarvodaya mission, however the environmental aspect does not play a significant role in Sarvodaya's work. How we treat the environment that supports and nourishes our lives is of critical significance in how one approaches life in general, and is an aspect of living peacefully with one another and the planet. Therefore, it is my recommendation that Sarvodaya incorporate environmental awareness and education into all levels of their Awakening programs.

It is my personal opinion that many of the troubles we face today are a direct result of the alienation of human beings from nature, and the disregard for our impact upon the planet, one another and future generations. Therefore, as difficult as it is for any one organization to address all the issues faced by its peoples, I do believe strongly that establishing an integral program of environmental awareness and stewardship would support the other work that Sarvodaya is currently engaged in, and that Sarvodaya could have an important impact on the Solid Waste Management issue faced by Sri Lanka. It is in the spirit of respect and hope that I offer the following recommendations.

The paper itself gives more in depth discussion about these recommendations but I have formatted them as a list here for ease of reading and reference. I hope that they will be of some assistance, or at least trigger discussion and ideas.

- Establish environmental awareness and solid waste management as a priority area for the movement.
- Dedicate a Unit at the Headquarters, responsible for integrating a holistic environmental agenda into the process of Village Awakening, and responsible for forming partnerships among other Sarvodaya Units and outside agencies, educational institutions, and organizations.
- Establish links with the Universities and offer internships and research projects to students in order to pursue further research, develop websites and virtual market places, and conduct skills trainings and workshops for villagers and urban poor.
- Conduct environmental Shramadanas that cut across class and ethnic boundaries to facilitate inter-group dialogue and an overarching sense of responsibility for the shared environment.
- Establish environmental committees in each village and provide training, support and follow-up to them. Create a replicable format (perhaps “A step-by-step manual to achieving environmental friendly communities”) that introduces the concepts and possible solutions or opportunities at the same time.
- Facilitate a participatory session with the community to talk about waste management practices and issues, as well as assessing economic status of families and who might need work opportunities, who has skills, etc.

- Establish an environmental committee with interested members and have them determine roles, goals and objectives as well as short-term, medium-term and long-term action plans.
- Conduct awareness, education and capacity building trainings.
- Offer business opportunities and support services for those interested in setting up micro-enterprises.
- Offer assistance to set up co-operative stores, waste collector and handicraft collaboratives, and build physical structures to house these activities.
- Participate in National Curriculum development in the Sri Lankan educational system.
- Integrate environmental component into schools and groups. Offer assistance to build community garden near school. Have curriculum prepared to give to teachers so they know how to incorporate education into the environmental activities and vice versa. Offer trainings on how to do this.
- Make recycling bins, composting facilities, etc readily available and have a handout available with listed contacts that villagers can reference in order to establish relationships with service providers in order to expand and develop their enterprises (See Resources).
- Conduct on-going programs that support and encourage villagers to continue creative waste management strategies. Gain publicity for these efforts to further encourage participation.
- Develop long-term goals for solid waste management, based on local needs, followed by medium- and short-term action plans for meeting the goals (WB SWM Strategic Planning, 2006).

- Integrate environmental awareness, waste reduction and waste diversion into the foundational structures of the community development process (i.e. Early Childhood, Mothers' Groups, Youth Groups, Elders Groups, etc) in a comprehensive way that includes incorporating curriculum and practical knowledge and skills acquisition into community garden projects, plastic recycling projects, glass making, paper making, cooking and nutrition classes and seminars.
- Collaborate with the Central Environmental Authority and ECO-V to maximize the information and resources already developed, and to develop capacity of Sarvodaya staff specific to the environment.
- Pursue funding to implement village level waste management enterprises like organic waste collection, plastic pelletizer equipment and other waste processing machinery to increase value, building of staging and storage units, waste picker collaboratives, communal vehicle programs for pick up and delivery of recyclables, medium-scale composting projects, community gardens and outdoor classrooms, training centers, food and toiletry coops to buy in bulk, mobile IT units with environmental and health education content, etc.
- Host National Shramadana Clean-up campaigns
- Initiate a sister city program with towns and villages in other countries via the telecenters or by a penal kind of exchange so that communities have a support system and a fun way of getting an outside perspective and a forum where they can safely share their concerns and successes.

- Establish youth environmental brigades and scholarship funds for participants. Monies earned would go into savings accounts for those who participate in clean-ups and trainings, etc.
- Establish more model villages and develop mentoring programs where those villages mentor neighboring villages to implement similar programs.
- Compile medical evidence to show linkages between unsound waste management and disease in order to help effect policy and prioritization of the problem. Link safe water with solid waste to increase priority (EPA, 1999).
- Emphasize community-based initiatives and move away from a dependence mentality, both on government and foreign aid.
- Work with government to obtain land for composting projects and other waste management projects.
- Collaborate with the Artacharaya Foundation in Galle on Solid Waste Management strategies at the village level.

7. Areas for Further Research

The workshops and training programs conducted during this research revealed that the people of Sri Lanka are very health conscious and can be motivated to change behaviors based on perceived or real health threats. In speaking with medical professionals, and through a relatively thorough investigation of literature available pertaining to SWM, it is my conclusion that this avenue has not been adequately utilized as a tool for behavioral and policy change specific to more sustainable waste management.

The Ministry of Environment and Natural Resources has conducted a massive campaign of awareness building in regards to POPs (Persistent Organic Pollutants) with significant success; this was proven when, during a workshop the trainer asked if anyone knew about pollution and a young girl promptly answered “Pops”. When asked if she knew what POPs are, she could not answer. People are not making the connections between burning their garbage, generating POPs and the incidence of illness in themselves and their families.

More research needs to be conducted to trace health trends related to the burning of wastes and emissions of POPs into the environment, and training materials and events need to make these connections clear in tangible ways. The research might be structured to look at areas in close proximity to ongoing garbage burn piles, like the one next to the Panadura train station, and incidences of related diseases as well as areas where burning of wastes is minimal so that comparisons can be drawn. This would be an excellent research opportunity for medical students and would offer the practical skill building experience that is presently missing in the Sri Lankan educational system (Gunawardena, 2006).

A national health awareness campaign linking burning of trash to specific health issues such as cancer, leukemia, asthma, immune system changes, learning disorders, birth defects, infertility and impotence, backed up with statistics to prove that the health problems the public are facing are likely related to the unsound waste management they are practicing could go a long way toward changing behaviors.

(Note: the Stop Smoking campaign undertaken over the past few years in Sri Lanka employed the tactic of linking smoking to impotence. Sri Lankans have told me that there are far fewer people smoking now and regulations that prohibit smoking in public places have been implemented and enforced. Five years back people thought that such a thing could never happen in Sri Lanka, and yet it has!)

Currently there are limited statistics available of health trends over the past fifteen years that could reveal garbage related illnesses in humans, such as cancers, birth defects, respiratory disease, and impotency, related to the unmonitored dump sites located in wetlands and low lying areas. Little to no research has been undertaken in Sri Lanka on the impacts of bioaccumulation of toxins in fish, birds, etc. This issue poses a two-fold threat to the country. On the one hand, the rich biodiversity Sri Lanka boasts of is potentially at risk due to the contamination of marine food sources (fish, crustaceans, etc) for important threatened species such as the Spot Billed Pelican. Since the healthy functioning of the ecosystems that humans rely upon is intimately connected with each of the parts therein, the extinction of any species, and particularly of key species, raises serious concerns for human health. Moreover, Sri Lankans rely heavily on the marine resources for a large portion of their daily diets and incomes, and the toxins found in the marine animals bioaccumulate in human fatty tissue, thereby posing health risks not only to the individual but also to unborn

children (Zender Environmental Institute, 2005; Sri Lanka Ministry of Environment, 2006; Washington State Dept Ecology, 2004).

Medical students and environmental science students, under the mentorship of university professors and experts in the field, could undertake a thorough investigation of water, sediment and fish tissue through proximity sampling. All parties would gain from a collaborative effort of this sort and the country would benefit by having a document produced and information disseminated to raise awareness. It is always a good idea to have a baseline measurement in order to have something against which to measure progress or regression and this sort of report would be invaluable in monitoring the effects of any solid waste management project. It would also assist in identifying the causes of pervasive diseases in order that action could be taken to protect the national health.

Further research could be undertaken in the area of small scale, community based technologies for waste reduction. Large-scale projects are costly and require tremendous organization, monitoring and upkeep. In a developing country these are often difficult factors to provide on a consistent basis. There is the additional liability of foreign debt incurred in order to purchase the equipment needed for large-scale operations. In the aftermath of Tsunami aid and relief from foreign NGOs and loans, and the ongoing debt service incurred from the International Monetary Fund and World Bank, debates have arisen in Sri Lanka around the sustainability and sensibility of debt-driven development.

“Aid promotes dependency on the part of the recipient country. Such long-term dependence on foreign aid is detrimental to the autonomous development policies of a country. . . Interest payments [on debt servicing] absorb nearly 40 per cent of government revenue, total debt-service charge exceeds total revenue.” (Senanayake, January 2006).

Community based, participative studies and brainstorming sessions should be undertaken to develop small-scale waste management industries that benefit the communities economically and address the waste disposal problems they face. Reliance upon Municipal services that cannot effectively meet the demands is exacerbating an already serious problem, not only in urban areas where it is a serious health hazard but increasingly in rural areas as well, particularly to the poor (Pilapitiya, 2006).

Neither is privatization of waste management services a sustainable answer in many cases. Theoretically, privatization is more efficient. However, in situations where corruption exists and monitoring and enforcement of regulations are low, there is a tendency toward low efficiency. Many private contractors have been awarded long-term contracts that do not contain any escape clauses; they therefore have no incentive to efficiently manage their enterprises. For example, recently the Burns Corporation received a 25-year contract to manage a large-scale composting facility near Colombo. The plan was to process 700 tons of organic waste per day. However only 40 tons a day are actually being composted. Without an escape clause in the contract there is no legal recourse for closing the operation down and so money has been spent without achieving any results (Pilapitiya, 2006).

By contrast, there are many successful precedents upon which community-driven and managed projects could be developed in Sri Lanka. In Dhaka, Bangladesh, projects are being implemented that focus on the recycling of wastes through the establishment of community and small scale composting facilities that both effectively manage the large amount of organic wastes generated and create viable incomes for poverty ridden populations (Ali, 2004). These types of projects reduce the load placed on Municipal Services and minimize the amount of “wet” waste going

to landfills. Once this moist component is removed, the amount of leachate can be better controlled, thereby reducing the health risks associated with landfills (Tan, 2006).

In Cairo, research undertaken by Helwan University in Egypt looked at the privatization of local solid waste management and its impacts upon the informal garbage collector's community. The Zabaleen migrant group of Cairo have been collecting and recycling waste since the 1930's. Organic wastes are used as fodder for pigs, and the meat sold to tourist facilities. In 1997, about one-third of the garbage of Cairo's 14 million inhabitants was handled by the Zabaleen with about 80% of that being recycled (Foreign, private companies are only required to recycle 20% of what they collect). World Bank projects have upgraded the living conditions of the Zabaleen and have helped in the establishment of micro-enterprises and investment in waste recycling equipment. The Zabaleen were able to upgrade their waste management procedures at a minimal cost to the city administration. Local communities prefer this system of garbage collection to private companies, and the trucks used by the larger companies cannot fit down the narrow streets of the city and so cannot effectively service many areas. In spite of all this, the government has been seriously considering privatizing waste collection by giving contracts to foreign, large waste management companies (Fahmi, 2005).

Researching ways of establishing efficient small-scale waste management enterprises offers the potential of creating viable livelihoods for a population currently unable to survive without government assistance, while providing community driven and monitored efficient delivery of service. The formation of waste collector cooperatives and collaboratives could lead to more efficient economies of scale while preserving the personal responsibility aspect of cottage industries. Paper making,

recycled paper stationery, rag rugs, various crafts and other recycling projects can also be implemented to involve the more vulnerable members of society such as women, children and the elderly.

In order to have small-scale projects that are profitable and sustainable, research into potential markets needs to be conducted, and linkages formed to facilitate selling the products. Avenues for compost sales include: large scale topsoil restoration projects, tree plantations, large scale farming projects, beautification of cities and tree planting projects, compost exporting for landscaping, etc. Numerous avenues exist through which to sell recycled craft products. Teaming with the Global Village Network and Telecenter projects will offer the opportunity to create virtual marketplaces on the web. Students can be given practical training in web design, graphic arts and marketing strategies by volunteering to work on Sarvodaya projects aimed at creating market linkages for villagers engaged in these ventures.

Bibliography

Ahlstrom, Charissa. (2003). Collaborating with Students to Build Curriculum that Incorporates Real-Life Materials. *Online Journal: Focus on Basics: Connecting Research & Practice*. World Education Journal Volume 6, Issue C. September 2003. Available: <http://www.ncsall.net/?id=192> [October 2006].

Ali, Mansoor. Promoting Compost as a business for urban poor. On-line project description Loughborough University Home page. Available: http://wedc.lboro.ac.uk/projects/new_projects3.php?id=58 [August 2006].

Ariyaratne, A.T., (Ed. N. Ratnapala) (1999). *Collected Works Vol I-VII*. Sri Lanka: Vishva Lekha Press.

Backyard Burning (2006). Online informational pamphlet. Available: <http://www.maine.gov/dep/air/backburn.htm> [August 2006].

Bandara, Nilanthi J.G.J. and Patrick J Hettiarachichi (2003). Environmental Impacts Associated with Current Waste Disposal Practices in a Municipality in Sri Lanka- A Case Study. Workshop on Sustainable Landfill Management 3-5 December 2003; Chennai, India. pp. 19-26. Available: www.swlf.ait.ac.th/.../Chennai%20Workshop%20pdf/Content.pdf. [July 2006].

Beyond Social Inclusion Towards Cultural Democracy. (2004). Online Article from the Cultural Policy Collective: Scotland. Available: www.culturaldemocracy.net. [October 2006].

Business and the Environment: Solutions for a Changing World. Business Guide to Waste Reduction and Recycling. (1998). Informational pamphlet by Xerox Corporation. New York.

Caring for the Environment 2003-2007-Path to Sustainable Development. (2003). Sri Lanka: Ministry of Environment and Natural Resources.

Dela, Jinie, Wendy Goldstein, Dhunmai Cowasiee (2006). "The role of communication". Sri Lanka: a Biodiversity Hotspot. Sri Lanka: Environmental Foundation Ltd. Journal Volume 22 (2): April-June 2006.

de Silva, Varuna (2003). Creating Quality Neighborhoods in Low-cost Public Housing in Sri Lanka: A Case Study: Summit Flats, Colombo, Sri Lanka. Available: <http://www.hdm.lth.se/TRAINING/Postgrad/HD/papers/2002/HD2002-20.pdf>. [July 2006].

Di-n-octylphthalate (DNOP) Public Health Statement (1997) Available: <http://www.atsdr.cdc.gov/toxprofiles/phs95.html> [August, 2006].

Ensure Environmental Sustainability Goal 7. (2005). The Country Team for the preparation of Millennium Development Goals Country Report 2005. Sri Lanka: National Council for Economic Development of Sri Lanka and sponsored by the United Nations Development Programme.

Fahmi, Wael Salah. Waste Collection in Cairo: between tradition and modernity (2005). Environment and Urbanization, Volume 17, Number 2. October 2005. Available: [http://www.id21.org/zinter/id21zinter.exe?a=i\\$w=U6wflh1](http://www.id21.org/zinter/id21zinter.exe?a=i$w=U6wflh1) [August 2006].

Ferndando, Harin (June 2006) The wandering collector. Explore Sri Lanka, Magazine, Number 42.

Focus on Burn Barrels. (2004). Pamphlet developed by Washington State Department of Ecology. Washington.

Garbage- the 2694 tonne reality. (2004). Sri Lanka Sunday Observer Environment Section, October 31, 2004. p. 40

Garner, Barbara. (2003). Creating Curricula for Challenging Circumstances. Focus on Basics: Connecting Research & Practice. World Education Journal Volume 6, Issue C. September 2003. Available: www.ncsall.net/?id=199 [October 2006].

Ghosh, Nirmal. (2000, August 30). One man's crusade cleans up a town. Sri Lanka Daily News, p. 9.

Guidance for Solid Waste Management: Analysis of Technology Choices, Community Initiatives, Environmental Issues, Private Sector Involvement, and Institutional Capacity Building. (2005). Prepared by the Sanitation Task Force. Sri Lanka.

Gunawardena, Chandra. (2006, August, 21). Issues Related to Education and Sustainable Development. Handout presented at the SLMA 2006 Issues in Sustainable Development lecture series.

Health Effects of Burning Trash. (2005). Pamphlet developed by Zender Environmental for Institute of Environmental Professionals and CCTHITA Solid Waste Alaska Network. Alaska.

Hermann, Judith. (1992, 1997). Trauma and Recovery. New York: Basic Books

Implementing a Pollution Prevention Program. (1998). Fact sheet by WWRC, a division of the Illinois Department of Natural Resources. Illinois.

Indian Ocean Tsunami Disaster of December 2004: UNDAC Rapid Environmental Assessment in the Democratic Socialist Republic of Sri Lanka (2005). Document of Joint UNEP/OCHA Environment Unit Available:

www.reliefweb.int/rw/RWB.NSF/db900SID/VBOL-69EHS9?OpenDocument.
[September 2006].

Indonesia Bali Urban Infrastructure Project. (2005). Document of The World Bank. Available:
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTUSWM/0,,contentMDK:20239149~menuPK:497508~pagePK:210058~piPK:210062~theSitePK:463841,00.html>. [September 23, 2006].

ISA - Korea's Solid Waste Management Market. (2003). U.S. & Foreign Commercial Service. Available: <http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr109806e.html>. [August 2006].

“Learning is Both Active and Reflective” (2000). Tap Into Learning (Technology Assistance Program) Volume 3, Issue 2, Winter 2000. Available: www.sedl.org/pubs/tapinto/v3n2.pdf. [October 2006].

Levitan, Lois C., David G. Cox, and Martha B. Clarvoe. (2005). Agricultural Plastic Film Recycling: Feasibility and Options in the Central Leatherstocking-Upper Catskill Region of New York State. Report and Presentation by Cornell University Environmental Risk Analysis Program. Available:
<http://environmentalrisk.cornell.edu/AgPlastics/>. [August 2006]

“Matters of Concern.” Challenges of Solid Waste Management in Sri Lanka. (2006). Pilapitiya, Sumith. Environmental Foundation Limited Journal Volume 22 (1): January-March 2006. Sri Lanka. Pages 2-6.

Moonesinghe, Vinod. (2003). Waste – A Global Problem. Available:
<http://www.sarid.net/archives/sarid-archives.htm>. [July 2006]

National Strategy for Solid Waste Management. (2002). [Government Report]. Ministry of Environment & Natural Resources Sri Lanka.

Patnaik, Dharitri and David Archer. (2002). From Teaching to Using Literacy: The Transformation of Reflect in India. Community Education International Journal: Volume 2 July 2002. Available: 217.206.205.24/resources/edacthome.htm. [October 2006].

Pilapitiya, Sumith (March 25, 2006) “Challenges of Solid Waste Management in Sri Lanka: Past, Present and Future.” Lecture delivered to the Civil Engineering Society Seminar on Solid Waste Management in Sri Lanka: Opportunities & Constraints. University of Peradeniya, Sri Lanka.

Popular Ways for Businesses to Reduce Waste. On line information leaflet. Available: <http://www.moea.state.mn.us/berc/srbiz.cfm>. [September 23, 2006].

Project Performance Assessment Report Socialist Republic of Sri Lanka: Colombo Environmental Improvement. (2003). Document of The World Bank. Available:
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTUSWM/0,,contentMDK:20239149~menuPK:497508~pagePK:210058~piPK:210062~theSitePK:463841,00.html>

MENT/EXTUSWM/0,contentMDK:
20239149~menuPK:497508~pagePK:210058~piPK:210062~theSitePK:463841,00.ht
ml. [September 23, 2006]

Puiggros, Adriana. Paulo Freire and the 'Pedagogy of Hope'. Available:
fcis.oise.utoronto.ca/~daniel_sch/bio.html. [October 2006].

Report on EFL's technical programme. (2005-2006). Environmental
Foundation Limited Annual Report. Sri Lanka.

Response to Recommendations From the National Tribal Environmental
Council's February 10-11, 1998 Albuquerque National Tribal Forum. (1999). United
States Environmental Protection Agency, Office of Solid Waste and Emergency
Response. Available: <http://www.epa.gov>. [August 2006].

Roche, Chris (2004) Impact Assessment for Development Agencies: Learning
to Value Change. Oxfam, UK.

Senanayake, R.M.B. (2006). Aid: Boon or Bane? Sri Lanka's dependency on
– and poor utilization of – aid could lead to economic stagnation LMD Journal:
January 2006. pg. 167.

Sri Lanka's Middle Path to Sustainable Development in the 21st Century:
National Report to the World Summit on Sustainable Development. (August 2002).
Colombo: Sri Lanka Ministry of Environment and Natural Resources

State of the Environment in Sri Lanka: A National report prepared for the
South Asian Association for Regional Cooperation. (2002) Colombo: Environmental
Economics & Global Affairs Division, Ministry of Environment and Natural
Resources.

Takiguchi, Hiroaki. 3R Initiative and the Experience of Japan in Sanitation
and Wastewater Management. Power Point presentation. Waste and Recycling
Department, Ministry of the Environment, Japan. Available:
[http://www.adb.org/Documents/Events/2005/Sanitation-Wastewater-
Management/presentation-takiguchi.pdf](http://www.adb.org/Documents/Events/2005/Sanitation-Wastewater-Management/presentation-takiguchi.pdf). [September 2006].

Tan, Reginald B.H. and Hsien H. Khoo. (2006). Impact Assessment of Waste
Management Options in Singapore. National University of Singapore, Singapore.
Journal of the Air & Waste Management Association, Volume 56: March 2006. pp.
244-254

Tantrigama, Gunatilake (2003) Coastal Resource Management and
Sustainability of Tourism: A Comparative Study of Hikkaduwa, Sri Lanka and Goa,
India. Available: [www://nsgl.gso.uri.edu/washu/washuw99005/9-Tantrigama.pdf](http://www.nsgl.gso.uri.edu/washu/washuw99005/9-Tantrigama.pdf).
[July 2006].

Theoretical Manual for Environmental Valuation in Sri Lanka. (2003).
Colombo: Ministry of Environment and Natural Resources Environmental,
Economics and Global Affairs Division.

Urban Solid Waste Management Guidelines. The World Bank. Available: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTUSWM/0,contentMDK:20239149~menuPK:497508~pagePK:210058~piPK:210062~theSitePK:463841,00.html>. [September 2006].

US-AEP Program Initiatives in Sri Lanka. *Sri Lanka Clean Air Initiative*. Available: <http://www.usaep.org/activities/initiatives/srilanka.htm>. [September 2006].

USAID. Women Cash in on Unique Waste Management and Recycling Effort: Plastics Bring Plentiful Payoff. Available: http://www.usaid.gov/stories/srilanka/fp_sl_plastic.pdf. [September 2006].

van Zonn, Levion and Nalaka Siriwardena. (2000). Garbage in Sri Lanka. IRMP, Colombo. Available: <http://environmental.scum.org/sl Waste-main.pdf>. [September 2006].

Veramu, Joseph. (2002). Community Based Approach to Development is the Way Forward. *Community Education International Journal* Volume 2 July 2002. Available: www.community-education.de/internationales/ICEAJournalJuly2002. [October 2006]

Waves of Compassion: Sarvodaya's Tsunami to Deshodaya Plan after Six Months of Action. (2005). Sarvodaya Annual Report. 2003-2004. Ratmalana: Sarvodaya Press

Waheed, Dr. Abdullah. Gold in Garbage-the Experience from Maldives. Available: <http://w3.whosea.org/extrelations/pdf/vol3-1/goldinGar.pdf>. [September 2006].

Wickenberg, Per et al (Eds). (2004) *Learning to Change Our World?* Studentlitteratur, Sweden

Zimmer, Prof. Dr. Juergen. (2002). The International Think Tank in Chiang Mai: A Step in Preparing the 10th ICEA World Conference on "Enterprising Community Education", 19th-23rd February 2003, in Delhi, India. *Community Education International Journal*: Volume 2 July 2002. Available: www.community-education.de/internationales/ICEA_Journal_July_2003.pdf. [October 2006].

Zurbrug, Christian (February 2003) Urban Solid Waste Management in Low Income Countries of Asia: How to Cope with the Garbage Crisis. Presented for Scientific Committee on Problems of the Environment (SCOPE) Urban Solid Waste Management Review Session, Durban, South Africa, November, 2002. Available: <http://www.sandec.ch/SolidWaste/Documents/04-SWManagement/USWM-Asia.pdf>. [July 2006].

Resources

Recycling Service Providers:

(This is a partial list. The complete list can be found at the Central Environmental Authority.)

1. Mallika Polypack Institute, P B Alwis Perera Rd, Katubedda, Moratuwa. Plastec Ltd.
2. Mr. A S Illyas, 98/7 Hospital Rd, Kalubowila, Dehiwala. Tel. 0777325697, 0112726736
3. Seth Sevana Padanama. Mr. P.R.L. Fernando (94) 071-2370103, (94) 011-2647045; No. 50, De. Soysa Rd, Ratawatta, Moratuwa
4. Recycling Industry. Mr. Upul Nishantha (94) 011-2721666. 17/2 Chakindharama Rd. Rathmalana.
5. G S Plastic. Mr. G S Penze. No 15, Kavdana Rd., Attidiya
6. Fawaz Plastic. Mr. M S K Fazly (94) 0722-771822
7. Techno Plastic. Mr. Senaka de Alwis (94) 011-2768728
8. Unic Enterprises. 21/2 Liyanagemulla, Seeduwa
9. C D Packaging. (94) 074-811945300B Naigala Junction, Batuwatta, Ragama.
10. Mr. Ravi. (94) 0777-411103. 131 Kalutara Road, Matugama
11. Poly Packaging Industries. (94) 037-2224703, 2233626, 4698988

Composting Bins

1. Arpico Bins. Arpico Plastic Ltd. Mr. Hiran De Silva, Institutional Sales Manager. 310 High Level Road, Navinna, Maharagama. (94) 074-310569. Mobile: (94) 0777-701032
2. Sewantha Bin. No. 14, School Avenue, Nawala, Rajagiriya. (94) 011-2879710
3. Wayamba Polymers Bin. General Manager: Arjuna Kotagama (94) 011-2876450, 2884570. 279/6 Talawatugoda Rd., Mirihana, Kotte
4. Chemical Industries Bin (CIC). SOLCO. (94) 3284216. CIC House, 199, Kew Road. Colombo 02.

5. REDCO Bin. REDECO Pavithra Compost Bin. (94) 2876608-9.
Kirimandala Mawatha, Colombo.

Community Mapping:

1. Mallika R. and S W K J Samaranyake . Institute for Participatory Interaction in Development. (94) 011-2587361/2365521. 591 Havelock Road, Colombo 06. ipidc@panlanka.net, info@ipidlk.org, www.ipidlk.org
2. Susil Siriwardena. (94) 011-2589591. Email: susilsir@sltnet.lk

Education:

1. Kamini Meedeniya Vitarana. Consultant – Women and Environment. (94) 11-2805695. 9, 5th Lane, Rajagiriya. Email: kaminv@sltnet.lk
2. Kim J. DeRidder. Academy for Educational Development (AED) Sri Lanka Peace Support Project. (94) 011-2665763, 2665764. No. 207/17 Dharmapala Mawatha, Colombo 07. Email: kderidder@aed.org/kderidder@aed.lk. www.aed.lk

Environmental Organizations and Experts:

1. ECO-V Environmental Friendly Volunteers: Kanchana Weerakoon Ranasinghe president and founder. URL: www.eco-v.org
2. Central Environmental Authority. M D Anil Suneetha. Director of Environmental Education and Awareness Division. (94) 011-2876641. No. 104, Denzil Kobbekaduwa Mawatha, Battaramulla. Email: suneethe@cea.lk
3. Central Environmental Authority. Lalitha Fonseca. Head of Environmental Education and Awareness Division. (94) 011-2872297. No. 104, Denzil Kobbekaduwa Mawatha, Battaramulla. Email: lalitif@cea.lk
4. The World Conservation Union (IUCN). (94) 011-2694094. 53 Horton Place, Colombo 07. URL: www.iucn.org
5. Dr. Ajantha Perera. Professor and environmental activist. Email: ajanper@sltnet.lk
6. Artacharya Foundation. URL: <http://www.arthacharya.com>

7. Achala Navaratne. Environmental Engineer and Solid Waste Management expert. achala.navaratne@gmail.com

Multi-Media and Information Technology:

1. Sharadha de Saram. Independent Media Consultant. (94) 011-2589161. 5, Charlemont Road, Colombo 06. Email: sha_desaram@yahoo.com
2. One World South Asia Rural Knowledge Centers Project. Director: Wasantha Samarasinghe. Email: wasantha_sam@yahoo.com

Environmental Education Facilities and Models

1. The Edible Schoolyard. URL: www.edibleschoolyard.org
2. Gron Flagg Eco Schools.
URL: http://www.eco-schools.org/countries/news/news_swe.htm
3. Hall Sverige Rent/NaturligtVis!
URL: <http://www.keepswedentidy.org/sa/node.asp?node=849>

Environmentally Friendly Product Distributors

1. TriNature Products. URL:
<http://www.greenclean.trinature.com/?pageId=4290>
2. Reusable/Recyclable Plastic Containers (use HDPE or PETE for ease of recycling): URL:
http://www.freundcontainer.com/category.asp_Q_p_E_%7C%7C36_A_c_E_38_A_HDPE+Plastic+Bottles
3. Reusable/Recyclable Plastic Containers (use HDPE or PETE for ease of recycling) URL:
http://www.priceleaderpackaging.com/hdpe_bullet_bottles.html

Appendix One: Key recommendations

Summarized from *Response to Recommendations From the National Tribal Environmental Council's February 10-11, 1998 Albuquerque National Tribal Forum, EPA, March 1999.*

1. Link safe water with solid waste to increase priority.
2. Address integrated waste management; look for potential crossover within areas.
3. Interagency initiative on clean up resources and to locate potential funding.
4. Build partnerships with neighbors to deal with jurisdictional issues, collection/disposal, and cleanups.
5. Create initiative to address land ownership and jurisdiction.
6. Provide opportunities (training, resources, etc) for tribes to enter waste management business.
7. Look for specific problems to target.
8. Pool all solid waste funding from all agencies.
9. Get a policy level commitment to secure dedicated, adequate, yearly funds for solid waste programs.
10. Work to eliminate concept of competition.
11. Establish funding mechanisms and base funding for each tribe [village].
12. Build and improve information, training, and education on solid waste management.
13. Redirect existing solid waste planning funds into other solid waste programs.
14. Hold more quarterly meetings.
15. Assign technical advisors and dedicated staff in agencies for solid waste.
16. Dedicated Tribal staff for solid waste issues
17. Develop audiovisual and reference materials to circulate to Tribes.
18. Set up scholarships to train Tribal members.
19. Create roving groups of advisors.
20. Conduct concentrated workshops.
21. Hold public events to promote programs
22. Develop intern programs for college students to bring information to Tribes and to enroll Tribal students.
23. Interns and academic credit for summer jobs.
24. Tribal representatives visit municipalities to share successful solid waste programs.
25. Rewrite regulations in lay terms.
26. Create Internet resources for information, workshops, video conferencing, chat lines and information from technical advisor.
27. Capability to network between Tribes to build Tribal capacity.

Appendix Two: Initial Meeting Wadduwa and Lagoswatte

May 24, 2006

Hello. My name is Dana Ecelberger. I am a graduate student visiting Sri Lanka for one year from America. I am studying with Sarvodaya and am interested in Nature and how people interact with Nature and the Environment. I am conducting research on garbage in Sri Lanka. It would be very helpful to me to hear your opinions and ideas about whether garbage is a problem in Sri Lanka.

Also, I want to do a project that would measure garbage generated by normal households and to see if trainings would help to reduce the amount of garbage thrown out each day. This project would mean meeting with you every other day for about ½ an hour to weigh the amount, and to separate it out into things that could be recycled or composted, etc.

I will work with you to find times that are convenient for you. I know that you are all very busy and I don't want to inconvenience you. The project will be two weeks out of every month until August of this year. It will not cost you anything and you will be able to see the results when I finish the research in November.

There is no wrong way to do the project. I am learning what the different ways of handling garbage are and how to do things in a better way. I am curious to know how you take care of your garbage so that I can write a report helping other people in Sri Lanka to take care of their garbage in the best way possible. You would be very helpful to my research if you would be willing to participate.

Your identities will be kept confidential. I will not tell anyone what you have said with your name attached. All results will be given without your names attached to them.

I would also like to hear what challenges or difficulties you are facing with garbage and together to try to find solutions to those problems. We can all help each other to figure things out this way.

Do you have any questions? Concerns or suggestions?

Are there 6 of you who would be willing to participate?

Appendix Three: Answers to Initial Questionnaire Wadduwa

May 25, 2006

Question 1: How do you get rid of your trash now?

1. Burning. Boxes, paper, food and plastic. Food waste to pigs.
2. Burning. Polythene, leaves, paper, food goes to pigs.
3. Burning. Polythene, paper, leaves. Food waste to pigs.
4. Burning. Polythene, paper, food. Food waste to pigs.
5. Burning. Polythene, tin, plastic. Food waste to pigs.
6. Burning. Polythene, leaves, tins. Food waste to pigs.
7. Makes compost with some, burns the plastic and polythene. Kitchen refuse, leaves from garden, polythene, tin, plastic. Food waste to pigs.

Question 2: How clean is your village in comparison to other areas?

1. We are better
2. We are better
3. We are better
4. Our area is good
5. We are better
6. Around houses clean, but in front of Samurthi bank is not clean.
7. Our house is clean

Question 3: Do you think there is a garbage problem in Sri Lanka”

1. Yes, in towns
2. Yes, in towns
3. Yes, in towns
4. In towns.
5. Yes, in towns
6. Yes, Colombo biggest problem, then villages because trash is thrown onto bare land Same as family 2
7. Yes, main cities are worst.

Question 4: Who picks up the garbage? How often? Where do you put your garbage?

1. Pradeshi Sabbath
2. Pradeshi Sabbath (District Council), twice a week
3. Near Samurthi bank.
4. Pradeshia Sabbath District Council, twice a week
5. Near Samuthi Bank. They were told by Pradeshi to put their garbage there for pick up.
6. Near Samuthi Bank
7. Near Samuthi bank. Pradeshia Sabbath (District Council), twice a week

Question 5: How do you think the garbage problem can be fixed or improved? (This question was tailored to their responses so it was asked as they discussed the questions and said that pick up was erratic and that, furthermore, outsiders were dropping garbage in their pick-up area and the animals were scattering it all over the place.)

1. Make them aware. Throw the garbage at the cars when they drop it off. (She was very upset about the outsiders dumping garbage. She also suggested building a statue of the Buddha to put where the garbage pile is so no one will dump garbage there.)
2. Worst area is n front of bank. Make Pradesha Sabatha aware
3. Yes, In front of bank is worst. Solutions: erecting statue of Buddha in that spot and making Pradeshia Sabbath aware of problem.
4. Make them aware
5. No answer.
6. Make Pradesha Sabatha aware
7. No answer

Question 6: Do you know what recycling is?

1. Don't know
2. No.
3. No
4. No
5. No
6. No
7. No

Question 7: Do you recycle now? I

1. no
2. no
3. no
4. No
5. Not in Sri Lanka but done abroad
6. No, good if we started
7. No

Question 8: If yes, where do you take it? If not, why not?

- 1, No awareness programs
2. No answer
3. Don't know
4. No awareness programs.
5. No one does
6. Don't know proper way
7. Don't know how.

Question 9: Would you be interested in training programs? What sort would be helpful to you, in regards to garbage in your village?

1. Compost making
2. Arpico compost bins would be nice
3. Making compost
4. To make compost

5. Compost making
6. Making compost
7. Making compost

Question 10: What are good times for you to attend trainings?

1. Sundays 2PM
2. Saturdays at 4PM
3. Sunday 1PM
4. Saturday 3PM
5. Any day after 1
6. Saturday 2PM
8. Sunday 2PM

Question 11: How often would you like to have trainings?

1. Once a week.
2. Once a week.
3. Once a week.
4. Once a week.
5. Once a week
6. Once a week
7. Once a week

Question 12: Are you interested in forming a committee in your village to deal with garbage issues?

1. Yes, interested.
2. Yes. Interested in forming committee
3. Yes. Interested
4. Yes. Interested in forming committee
5. Yes
6. Yes.
7. Yes.

Question 13: Do you have any other comments or concerns?

1. Outsiders dumping is a problem.
2. Big problem is that outsiders come in and dump their trash.
3. Outsiders dump their garbage in front of Samurthi bank
4. Big problem is that outsiders come in and dump their trash
5. Outsiders dump
6. Outsiders dropping trash is a BIG problem.
7. Outsiders dump

Appendix Four: Answers to Initial Questionnaire Lagoswatte

May 25, 2006

Researcher's Note: I have compiled because they all answered with the same answers. I have the impression they are saying what should be rather than what is, but could not fully get around this. Difficulties with translator and only 3 families showed up. Will be sure to pay attention when in the village and will try to get to this questions as the project goes on.

Question 1: How do you get rid of your trash now?

Food waste goes to pigs. Kalahari came on the 29th to conduct a training on how to handle the recyclables. Families were told to compress plastics, heavy plastics separate and thin plastics could go with polythene. Some families are composting. Once a week families are to take their recyclables to the collection bins where a designated person will make sure everything goes in proper spot. Kalahari will pick up and pay them for it. Money goes to Shramadana Society as a whole. They mentioned something about eventually having their own means of processing the recycling but not sure what this is about. Noticed garbage in the woods as well so some people are tossing it in the brush behind their houses. They say they do not burn anything.

Question 2: How clean is your village in comparison to other areas?

Very clean.

Question 3: Do you think there is a garbage problem in Sri Lanka?

Yes. It is the worst in the city and along the coast.

Question 4: Who picks up the garbage? How often? Where do you put your garbage?

They each are responsible for taking their garbage to the recycling bins and the monitor will separate it.

Held a Shramadana to clean everything up. Tractors took the trash away. New system in place now that takes recyclables to collection bins each week and Kalahari picks up.

Question 5: Do you think garbage is a problem in your village?

Everyone said no, they had had a training and were not expecting to have any more problems with garbage.

Question 6: Do you know what recycling is?

They have all had a training done by Kalahari Enterprises.

Question 7: Do you recycle now?

Yes.

Question 8: Where do you take your recycling?

It goes into the containers built by Sarvodaya and the recycling company will come to pick it up.

Question 9: What sort of training programs or activities would be helpful to you in regards to garbage in your village?

Have already had workshops in recycling and separation of trash, gardening, compost making. They knew how to compost but never did before because there was no system. No need for more training they say. They are waiting to be given their own containers for separating trash.

Question 10: What are good times for you to attend trainings?

No answer

Question 11: How often would you like trainings?

No answer

Question 12: Do you have any other concerns or comments?

They may like to have further composting workshops. Some people are concerned about flies in the compost bins, which are close to houses, and also about the water they wash fish with.

Appendix Five: Answers to Second Questionnaire Wadduwa

July 27 2006

Project Related

Question 1: How did you get included in my project?

1. Sarvodaya
2. Sarvodaya
3. Sarvodaya
4. Sarvodaya
5. Society chose her.

Question 2: Was it your choice or were you required to participate? By whom?

1. Agreed to participate
2. Her choice
3. Chose to participate
4. Her choice
5. Agreed willingly

Question 3: How do you feel about participating in the project?

1. Good. Made her more aware.
2. Good
3. Good. She doesn't know why.
4. Good. Less garbage. She's more aware and brings less garbage in now.
5. Good

Question 4: Do you feel like you are learning anything from the project?

1. She learned about the effect of garbage on the environment and health. Both the workshops by Kanchana and the project made her more aware.
2. She learned about polythene, etc from workshop. The daily weighing of garbage made the concepts stick.
3. Learned to separate garbage (my note: she actually rarely did separate it though.)
4. She is more aware of reducing garbage. Doesn't burn anymore. (My note: but her husband does when he comes home because there is a big pile of garbage that she doesn't know what to do with.)
5. Yes, Dangers of polythene and burning trash, especially plastics. Also learned to reduce the amount of garbage by taking their own bags shopping and asking for fewer bags.

Question 5: How does the project affect your daily life? (ex. More work, fun, easy, hard)

1. No problem for her to participate.
2. No problem
3. Not more work to separate.
4. No problem.
5. They only have a little garbage so it is not a big problem for them.

Question 6: What would help you to feel more interested in the project or that would make it easier for you to participate?

1. It was fine as it was.
2. Never has done a project like this, but it was good.
3. No answer.
4. No
5. Don't know.

Their Lives/Background Information

Question 1: How long have you lived in this village?

1. 2 years
2. 6 years
1. 7 years. Lost house in Tsunami
2. 6 years ago. Government gave land here for them to build their house. All Tsunami damaged.
3. 6 years

Question 2: Where did you live before if not here?

1. She has always lived here.
2. Thalpititiya North. They lost their house in the Tsunami
3. few miles away
4. Used to live in Wadduwa Dampiagama
5. near the church in Wadduwa
- 6.

Question 3: Who is the head of household in your family?

1. Husband
2. Husband
3. her husband
4. Husband
5. Husband
- 6.

Question 5: What is your position in the family? (ex. Wife, husband, son, daughter, etc)

1. Wife and mother
2. Wife, mother
3. wife, mother, grandmother
4. Wife and mother
5. She is the 2nd in charge, a wife and a mother. Her mother is often at the house too so she is also a daughter.

Question 6: How many people work for income in your house?

1. Husband
2. One + daughter.
3. husband is a seasonal fisherman and her son in law brings in income
4. Husband

5. Husband

Question 7: What kind of work do those people perform?

1. Boutique operator
2. Husband's work is nothing permanent. Laborer. He does masonry work, painting, building skills. Daughter works at the Ayurvedic hospital
3. fisherman
4. Fisherman
5. Fisherman/seasonal income

Question 8: Did they do a different kind of work before?

1. Has always been in this business.
2. No
3. always
4. Always a fisherman
5. Has always been a fisherman

Question 9: Do you feel your family has an adequate amount of income?

1. The boutique business is going down. It is hard to get capital and the cost is too high to run the store now.
2. Barely just manage. Unreliable. Income varies
3. With difficulty they are managing
4. They manage with difficulty
5. Not enough. She wants to work also to supplement their income but it is very difficult for her.

Question 10: How many people are in your family?

1. 5. Mother in law, brother, wire, husband and daughter
2. 6
3. 7. Her mother, self, husband, daughter, son in law, grandchildren
4. 3
5. 4

Question 11: What are the ages?

1. 62, 36, 34 32, 1
2. 45, 42, 24, 22, 20, 11
3. 98, 42, 48 (her), 27, 31, 11, 8
4. 40, 38, 18
5. 4, 11, 30, 34

Question 12: Who in your household is responsible for garbage management?

1. She is
2. Daughter and wife
3. Wife
4. She is
5. She is

Question 13: How was this decided?

1. She must do her own work
2. Women do this kind of work

3. No answer
4. She just does it
5. It just happened that way

Question 14: Do you feel it is important to have a clean environment?

1. Yes, husband cleans the garden
2. Yes
3. Yes
4. Yes
5. Yes. She cleans the yard daily

Question 15: Do you know anyone who throws their garbage into the woods or any other place besides where it is supposed to go for municipal pick up? (I don't want to know who does it, just if you know anyone who does.)

1. Yes
2. Yes
3. Yes
4. Yes
5. People put trash on the road

Question 16: Why do people do this, do you think?

1. Ignorance. They don't listen to neighbor's advice.
2. Everyone in the village dumps their garbage. The food waste goes to the pigs. The farmer picks it up.
3. No place to put it.
4. Ignorance
5. No alternative. She has noticed there has been less garbage. Maybe because people are burning it.

Question 17: Do you think that is a problem?

1. Yes, mosquitoes breed there
2. Yes, mosquitoes breed and it smells bad. The burning trash now worries her.
3. Yes
4. Dirt and garbage comes into their house with the wind

Question 18: What do you think would be a good solution to keep them from doing this?

1. If neighbors try to tell each other to stop then it starts a fight.
2. Don't know. They might dump it in the night. Maybe if they impose a fine. To solve the problem of the garbage maybe they need to ask for help from the priest or Grama sewaka
3. They will never listen. Old residents are against the newcomers. They say that they always burned trash in the past and don't see it as a problem. They don't realize that now there is plastic in it and that is different from burning leaves and organics. Another big problem is that strangers come into their village and throw garbage around. Wadduwa hotel washes floors and it floods into her house mixed with the cleaning chemicals. They also have a plot of land they dump their garbage on and it attracts flies.
4. No answer
5. Compost, recycling would help.

Question 19: Would you be interested in being part of a committee to organize monthly clean ups for your village?

1. Yes
2. Yes
3. Doesn't really have time
4. No answer
5. Yes

Question 20: Would you be interested in learning more about a way to earn money by collecting recyclables in your area that will then go to the recycling company?

1. Yes. Money to go to SSS.
2. Yes
3. No answer
4. Yes.
4. Yes

Question 21: (added by Mrs. Rodrigo) Do you feel garbage is dangerous?

1. Yes, smell from garbage is bad, mosquitoes and burning trash are dangerous
2. Yes
3. No answer
4. Yes
5. Reptiles breed in it.

Appendix Six: Answers to Second Questionnaire Lagoswatte

6/30/2006

Project Related

Question 1: How did you get included in my project?

1. Society named her
2. Nominated by SSS
3. SSS cross selection
4. SSS nominated her

Question 2: Was it your choice or were you required to participate? By whom?

1. She agreed
2. Agreed to participate
3. She agreed to do it.
4. She was asked and she agreed.

Question 3: How do you feel about participating in the project?

1. It is the first time they have realized how much garbage in the house.
2. Liked it. Learned about garbage. Used to burn but now doesn't.
3. Increased awareness. It is good.
4. Likes it.

Question 4: Do you feel like you are learning anything from the project?

1. They liked the project. It increased their awareness.
2. Burning garbage is not good. Also learned about how to recycle. Didn't know how before.
3. Previous training before the project helped. (She is referring to Kanchana's workshop, which she said was very helpful.)
4. She came to understand how much garbage she was creating.
She did not come to Kanchana's workshop. She understands the project is for my studies.

Question 5: How does the project affect your daily life? (ex. More work, fun, easy, hard)

1. Liked it and enjoyed it. Have to learn about the environment so she was glad to do that. She feels a responsibility to learn.
2. Enjoyed it. It was not hard and did not take a lot of time. She is composting now but needs to cover it. Likes the idea of a large composting project. Some people throw their food in the forest.
3. No problem for her.
4. No problem. She liked it. Our confidence in her motivated her. It was nice to be chosen by Sarvodaya. Also nice to support my research.

Question 6: What would help you to feel more interested in the project or that would make it easier for you to participate?

1. Garbage disposal. She is in a corner (has more land) and can easily put garbage behind the house but the houses in the middle find it more difficult to dispose of their garbage. There is nowhere for them to even put their food remnants. There is an access road on the shortcut and people are throwing their bags of garbage there. It floods and garbage gets into the water. There are bad smells.

❖ The problems with composting are:

- The bins are not covered and flies come in to the house.
- They need workshops on how to reduce wastage. People are not separating recyclables because they are not aware of how to do it. Would be a good idea to teach the mother's group at the preschool.
- They need 3 more buckets to properly separate out garbage. She suggests big ones that 3-4 families can share.
- Maybe barrels cut in half placed at a central spot between houses for recycling and put signs on them saying "Glass" "Plastic" etc. Would be good PR for visitors to the village.

2. Ok as it was. No suggestions.

3. It was good as it was.

Comments: She said that Sarvodaya should be made aware of the people not participating so they can work with them. I explained that confidentiality won't allow me to tell Sarvodaya that sort of thing but perhaps as a community they can do something.

She also talked about the fact that a tractor is coming from the municipality to pick up trash now since the recycling is not really happening. She is concerned that this will be a disincentive for people to take the time and effort to separate. (I need to remember to mention to Sarvodaya that not starting the recycling right away will turn people off to the whole concept. Very destructive to what they are trying to accomplish.)

4. It would be helpful to have baskets for separating trash.

Their Lives/Background Information

Question 1: How long have you lived in this village?

1. 5 months
2. 4 months.
3. 3 months
4. 4 months

Question 2: Where did you live before if not here?

1. Kalutara North, then camps after the Tsunami
2. Kalutara North camp
3. Kalutara North camp after Tsunami. Originally from Matugama. Lost house in tsunami
4. Kalamoola, then Nagodadripotwata after Tsunami. In camp for one year.

Question 3: Who is the head of household in your family?

1. Husband
2. Mother-in-law

3. Husband
4. Husband

Question 5: What is your position in the family? (ex. Wife, husband, son, daughter, etc)

1. Wife and mother
2. Wife and mother
3. Wife and mother
4. Wife and mother

Question 6: How many people work for income in your house?

1. She is self-employed as a boutique owner and her husband is a welder.
2. Husband works
3. Husband
4. One

Question 7: What kind of work do those people perform?

1. Mason
2. Drives a 3 wheeler that was bought on credit from family member
3. Mason. Work is unreliable due to weather.
4. Boutique and welding

Question 8: Did they do a different kind of work before?

1. Did the same job
2. Was a fisherman
3. Was always a mason
4. Same work before

Question 9: Do you feel your family has an adequate amount of income?

1. No. Too little. School for child is expensive and far so bus fare adds up.
2. Just enough.
3. If he gets work it is enough so she is careful with money.
4. Not always. It is unreliable.

Question 10: How many people are in your family?

1. 4
2. 4
3. 5
4. 4

Question 11: What are the ages?

1. 36, 34, 14, 9
2. 30, 29, 23, 10, 5
3. 65, 25, 24, 4, 2
4. 35, 30, 10, 3

Question 12: Who in your household is responsible for garbage management?

1. Daughter and mother, sometimes father. He cleans Garden.
2. Her
3. She is. Mother in law doesn't separate garbage.

4. She is.

Question 13: How was this decided?

1. Just happened that way.
2. He is not at home to do it.
3. She has the commitment to do it.
4. She decided to do it because she wants to keep the house clean.

Question 14: Do you feel it is important to have a clean environment?

1. Yes, very
2. Yes
3. Yes. It is very good for the mind.
4. Yes, very.

Question 15: Do you know anyone who throws their garbage into the woods or any other place besides where it is supposed to go for municipal pick up? (I don't want to know who does it, just if you know anyone who does.)

1. Yes
2. One or two families do.
3. Yes
4. Yes

Question 16: Why do people do this, do you think?

1. Habit, carelessness. It isn't hard to do it right so just careless.
2. Habit.
3. Bad habits. Nowhere for them to put garbage properly.
4. Nowhere else to put it.

Question 17: Do you think that is a problem?

1. Yes
2. Yes. She doesn't like it and when she points it out to them they don't listen.
3. She doesn't like it.
4. Not happy about it.

Question 18: What do you think would be a good solution to keep them from doing this?

1. Education through advisory committee.
2. They don't go to meetings and they don't listen so maybe a fine.
3. Compost bins were promised but people may not like to change their habits.
4. Shared bins, buckets to separate garbage.

Question 19: Would you be interested in being part of a committee to organize monthly clean ups for your village?

1. Already have done that.
2. If she has time.
3. No answer.
4. Already in one.

Question 20: Would you be interested in learning more about a way to earn money by collecting recyclables in your area that will then go to the recycling company?

1. Would be interested in compost or other micro enterprises.
2. No answer
3. She is concerned they will collect their recyclables and do things but that no one will collect and take it away.
4. Yes

Question 21: (added by Mrs. Rodrigo) Do you feel garbage is dangerous?

1. Yes
2. Non-degradables most dangerous
3. Yes. Causes sickness
4. Yes. Just having it around is bad. Germs, flies and sickness.

Appendix Seven: Human Subject Release Form

Dana Ecelberger
Mobile phone: 0779736909
School for International Training
c/o Sarvodaya
155A Dr Danister de Silva Mawatha
Colombo 08, Sri Lanka
Garbage Measurement Project Consent Form
August 3, 2006

Hello

Thank you for participating in the garbage measurement program I am conducting for my master's thesis research. In order to complete the project, I need to obtain your consent to use the data, gathered during the project, in the report that I will submit to Sarvodaya and in the final thesis. Prior to sharing the report we will meet and you will have the opportunity to correct any wrong or incomplete answers. Before leaving Sri Lanka, in December, I will give a copy of the report to your Shramadana Society, so that you may look at it if you are interested.

As outlined in our initial meeting, all data used in the report and final thesis is anonymous. Neither your name nor address will be used in any reports describing the project or results of the research.

By signing this consent form you agree that you were fully informed of the nature of the project and that you agreed to voluntarily participate. You also agree that data from the project and observations gained during the project can be used in my final thesis and may be used in later research, reports and/or publications.

There is an additional consent at the bottom of this form that asks for your permission to use photos or video footage taken during the project. Again, your name will not be attached to these images.

You are not required to sign these consent forms if you have an objection to the use of data and/or photos. If you prefer I not use your data and/or photos you will not be included in the report.

If you have any concerns or questions about this consent form or any aspect of the project, you may contact me at (077-973-6909), or you may contact my academic advisor, Dr. Kanthie Athukorala (077-766-8883) at 155A Dr. Danister de Silva Mawatha, Colombo 08, Sri Lanka.

Please sign below if you give permission to Dana Ecelberger to use data gathered during the Garbage Measurement Project of 2006, understanding that full anonymity will be observed.

Thank you,

Dana Ecelberger

Participant Name and Signature

Additional Consent:

*Please sign below if you give permission for the use of photos, and/or video footage, of you and/or your family, workshop photos and photos of your home, garden and/or garbage in the final presentation of the project. Your name will not be used with the photos.